ROBO-8780VG2A

Single Host Board

User's Manual

Version 1.0

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Appendix A

Appendix B

How to Use This Manual

The manual describes how to configure your ROBO-8780VG2A series system to meet various operating requirements. It is divided into five chapters, with each chapter addressing a basic concept and operation of Single Host Board.

Chapter 1 : System Overview. Presents what you have in the box and give you an overview of the product specifications and basic system architecture for this series model of single host board.

Chapter 2 : Hardware Configuration. Shows the definitions and locations of Jumpers and Connectors that you can easily configure your system.

Chapter 3 : System Installation. Describes how to properly mount the CPU, main memory and Compact Flash to get a safe installation and provides a programming guide of Watch Dog Timer function.

Chapter 4 : BIOS Setup Information. Specifies the meaning of each setup parameters, how to get advanced BIOS performance and update new BIOS. In addition, POST checkpoint list will give users some guidelines of trouble-shooting.

Chapter 5 : Troubleshooting. Provides various useful tips to quickly get ROBO-8780VG2A series running with success. As basic hardware installation has been addressed in Chapter 3, this chapter will basically focus on system integration issues, in terms of backplane setup, BIOS setting, and OS diagnostics.

The content of this manual is subject to change without prior notice. These changes will be incorporated in new editions of the document. **Portwell** may make supplement or change in the products described in this document at any time.

Updates to this manual, technical clarification, and answers to frequently asked questions will be shown on the following web site : http://www.portwell.com.tw/.

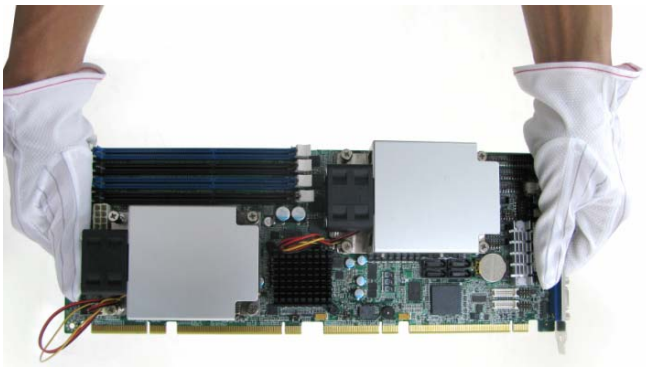
Notice

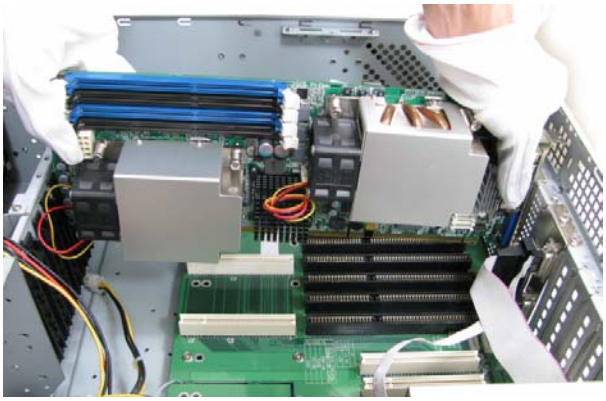
SBC Handling and Installation Notice

- Handling and Installing SBC

Caution: Do not just hold any single side of the SBC; hold evenly on both sides!

- Heavy processor cooler may bend the SBC when SBC being held just on one side.
- The bending may cause soldering or components damaged.





■ Fix your SBC in System

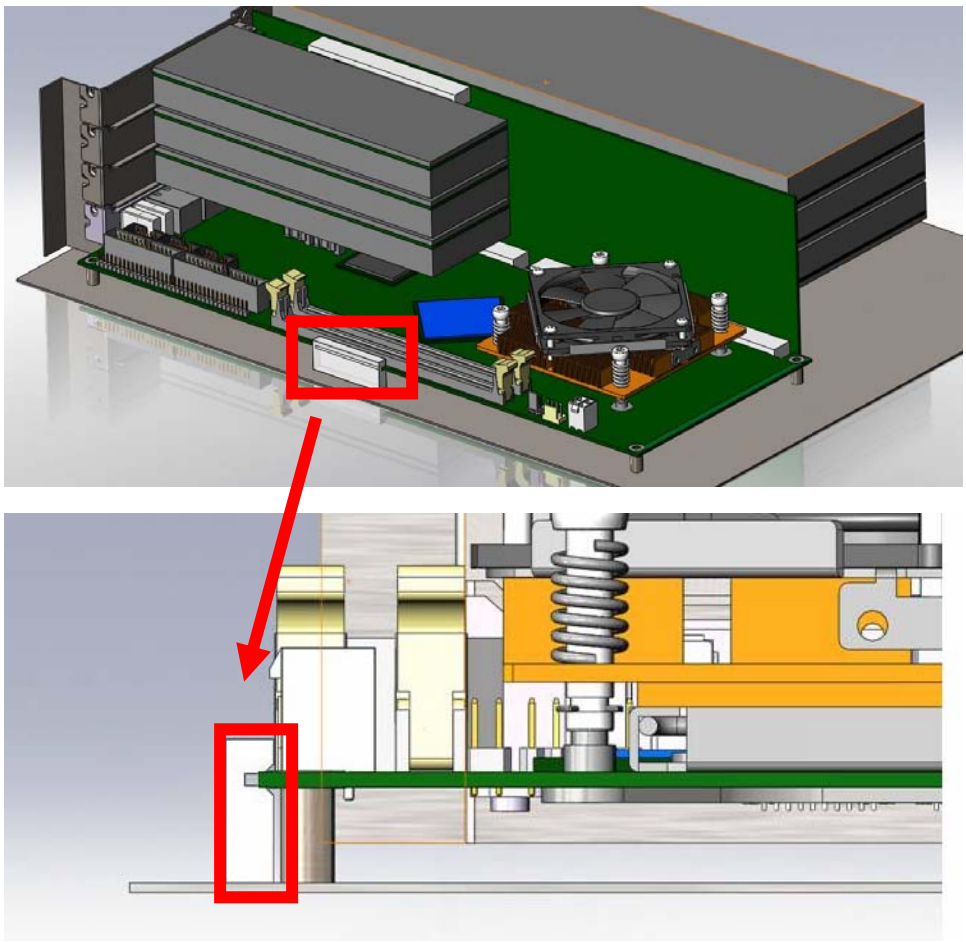
Caution: Suggest your S.I or vendor to use a metal bracket to hold/fix the desktop or server grade SBC to avoid the vibration damage during transportation. Heavy processor cooler may bend the SBC when systems are during transportation without any holder.

Example:

- 4U chassis :

  ➔ Use L type mental or plastic or rubber bracket to hold SBC.

- 2U or 1U chassis: a mental bracket on the bottom of chassis to balance and support SBC from bending.



Chapter 1
System Overview

1.1 Introduction

ROBO-8780VG2A, the PICMG 1.0 SBC (Single Board Computer) supports the Intel® Core i7/i5/i3 and Pentium processors in LGA1155 package. The attractive Core i3/i5/i7 and Pentium family processors delivers not only high computing power but also high graphic performance. That makes the system more powerful.

ROBO-8780VG2A adopts Intel® entry level H61 PCH that supports up to Intel® Core i7 processor and 16GB DDR3-1333 system memory. Intel® Core i series processors equipped Intel® integrated Graphics Engine, that supports DirectX10.1, Shader Model 4.0 and OpenGL 3.0.

ROBO-8780VG2A supports dual Gigabit Ethernet port, four SATA 300 ports, ten USB 2.0 ports, One RS232 port, one RS232/422/485 port selectable by jumper, one parallel port, and one FDD port, GPIO and Watchdog timer as usual. Dual USB 3.0 ports support also built on ROBO-8780VG2A.

In addition, ROBO-8780VG2A supports multiple displays, such as VGA port up to 2048 x 1536 resolution, one DVI-D port up to 1920 x 1200 resolution and so on. ROBO-8780VG2A is an ideal entry level PICMG 1.0 SBC with higher graphic performance and computing power for the market demand.

ROBO-8780VG2A brief specifications:

- Support Intel® Core i3/i5/i7 and Pentium processor in an LGA1155 socket
- Dual 240-pin DDR3 SDRAM DIMM socket, support for DDR3 1066/1333 DIMMs, up to 16GB system memory
- Intel® Core i processors integrated graphics engine
- Equipped dual Gigabit Ethernet port
- Support two COM ports, four SATA 300 ports, ten USB 2.0 ports (dual ports on bracket), and dual USB 3.0 ports
- Support dual display by VGA (on bracket) and DVI-D

1.2 Check List

The ROBO-8780VG2A package should cover the following basic items:

✓One ROBO-8780VG2A single board computer
✓Two SATA 300 cable
✓One 4-pin ATX power control cable for backplane connection
✓One FDD and Parallel ports with bracket
✓Dual COM port cable with bracket
✓One Installation Resources CD-Title

If any of these items is damaged or missing, please contact your vendor and keep all packing materials for future replacement and maintenance.

1.3 Product Specification

- **Main processor**
  - Intel® Core i3/i5/i7 and Pentium Processor in LGA1155 package
- **BIOS**
  - AMI uEFI BIOS
- **Main Memory**
  - Support dual-channel & signal channel DDR3 memory interface
  - Non-ECC, non-buffered DIMMS only
  - Two DIMM sockets support 1,066/1333 DDR3-SDRAM up to 16GB System Memory
- **Chipset**
  -Intel® H61 PCH
- **Bus Interface**
  -Follow PICMG 1.0 Rev 2.0 standard (32-bit PCI and 16-bit ISA)
  -Fully complies with PCI Local Bus specification V2.2 (support 4 master PCI slots via ITE 8892E PCIEx1 to PCI bridge)
  -Support ISA function via Fintek LPC to ISA bridge F85226FG
- **Floppy Drive Interface**
  -Support one FDD port up to two floppy drives and 5-1/4"(360K, 1.2MB), 3-1/2" (720K, 1.2MB, 1.44MB, 2.88MB) diskette format and 3-mode FDD
- **Serial Ports**
  -Support two serial ports, one is RS232, the other is RS232/422/485 selectable by jumper.
- **Parallel Port**
  -Support one parallel port with SPP, EPP and ECP modes
- **USB Interface**
  - Support ten USB 2.0 (Universal Serial Bus) ports for high-speed I/O peripheral devices (Dual USB ports on bracket) and dual on-board USB 3.0 ports

- **Audio Interface**
  - On board Audio codec via HD Audio interface
  - One optional Audio kit PA-M1AU for Mic in/Line in/Line out.
- **PS/2 Mouse and Keyboard Interface**
  - Support one on-board connector for PS/2 keyboard/mouse connection
- **ATX Power Control Interface**
  - One 8-pin header to support ATX power control via backplane
- **Auxiliary I/O Interfaces**
  - System reset switch, external speaker, and HDD active LED, etc
- **Real Time Clock/Calendar (RTC)**
  - Support Y2K Real Time Clock/Calendar with battery backup for 7-year data retention
- **Watchdog Timer**
  - Support WDT function through software programming for enable/disable and interval setting
  - Generate system reset
- **SATA**
  - Four SATA 300 ports (w/o RAID function)
- **On-board VGA**
  - Intel Core i processors integrated Graphics device
- **Display**
  - One VGA port, up to 2048 x 1536
  - One DVI-D port up to 1920x1200
- **On-board Ethernet LAN**
  - One Intel 82579LM and one Intel 82583V Gigabit controller to support dual RJ-45 connector on brakcet
- **High Driving GPIO**
  - Support 8 programmable high driving GPIO
- **Cooling Fans**
  - Support one 4-pin and one 3-pin headers for CPU, and System fans
- **System Monitoring Feature**
  - Monitor CPU temperature, system temperature and major power sources, etc
- **Bracket**
  - Support dual Ethernet port with 2 indicators, dual USB ports, and one CRT port
- **Outline Dimension (L X W):**
  - 338.5mm (13.33") X 122mm (4.8")
- **Power Requirements:**

  +12V (CPU) @5.3A

  +12V (System) @ 6.5A

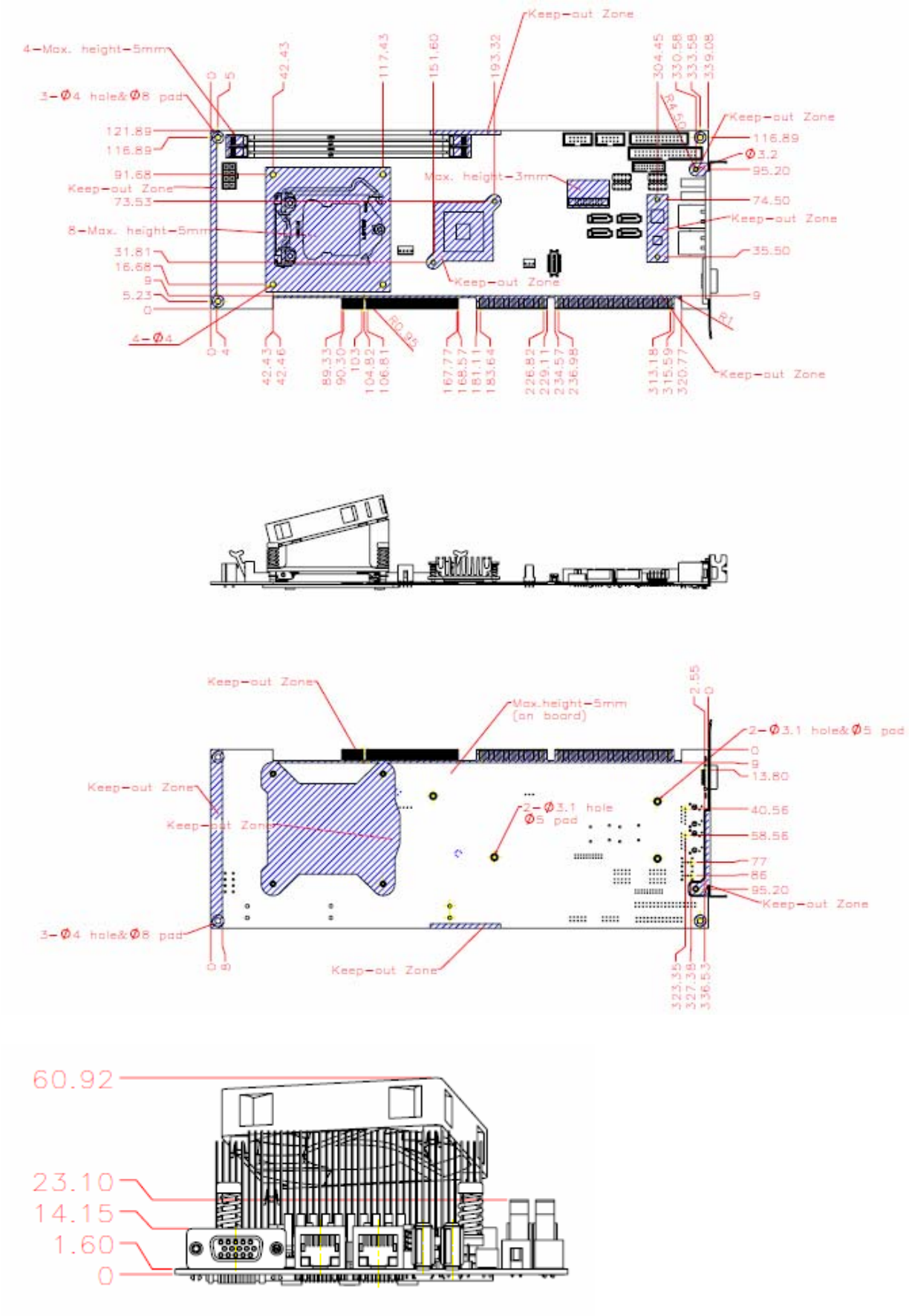
  +5V (System) @4.7A

Configuration:

System Configuration	
CPU Type	Intel® Core™ i7-2600 CPU@3.4GHz L3:8M
SBC BIOS	Portwell, Inc. ROBO-8780VG2A BIOS Rev.:R1.00.E1(06192012)
Memory	Apacer UNB PC3-8500 2G*1 (ELPIDA J1108BFBG-DJ-F)
VGA Card	Onboard Intel ® Sandy Bridge HD Graphics Family
VGA Driver	Intel ® Sandy Bridge HD Graphics Family Ver:8.15.10.2622
LAN Card	Onboard Intel ® 82579LM/82583V Gigabit Network Connection
LAN Driver	Intel ® 82579LM/82583V Gigabit Network Connection Ver:11.15.12.0/11.14.48.0
Audio Card	Onboard Realtek ALC886 High Definition Audio
Audio Driver	Realtek ALC886 High Definition Audio Ver:6.0.1.6649
Chip Driver	Intel® Chipset Device Software Ver:9.3.0.1019
USB 3.0 Driver	Renesas Electronics USB3.0 Host Controller Ver:2.0.4.0
SCSI Card	Adaptec 29160LP
SCSI HDD	Seagate ST39173W 20G
SATA HDD	Seagate ST3160815AS 160G
Compact Flash	N/A
FDD	TEAC FD-235HF
CDROM	Pioneer K BXCN2
Power Supply	FSP-FSP350-60GLC
Back plane	14A7-A

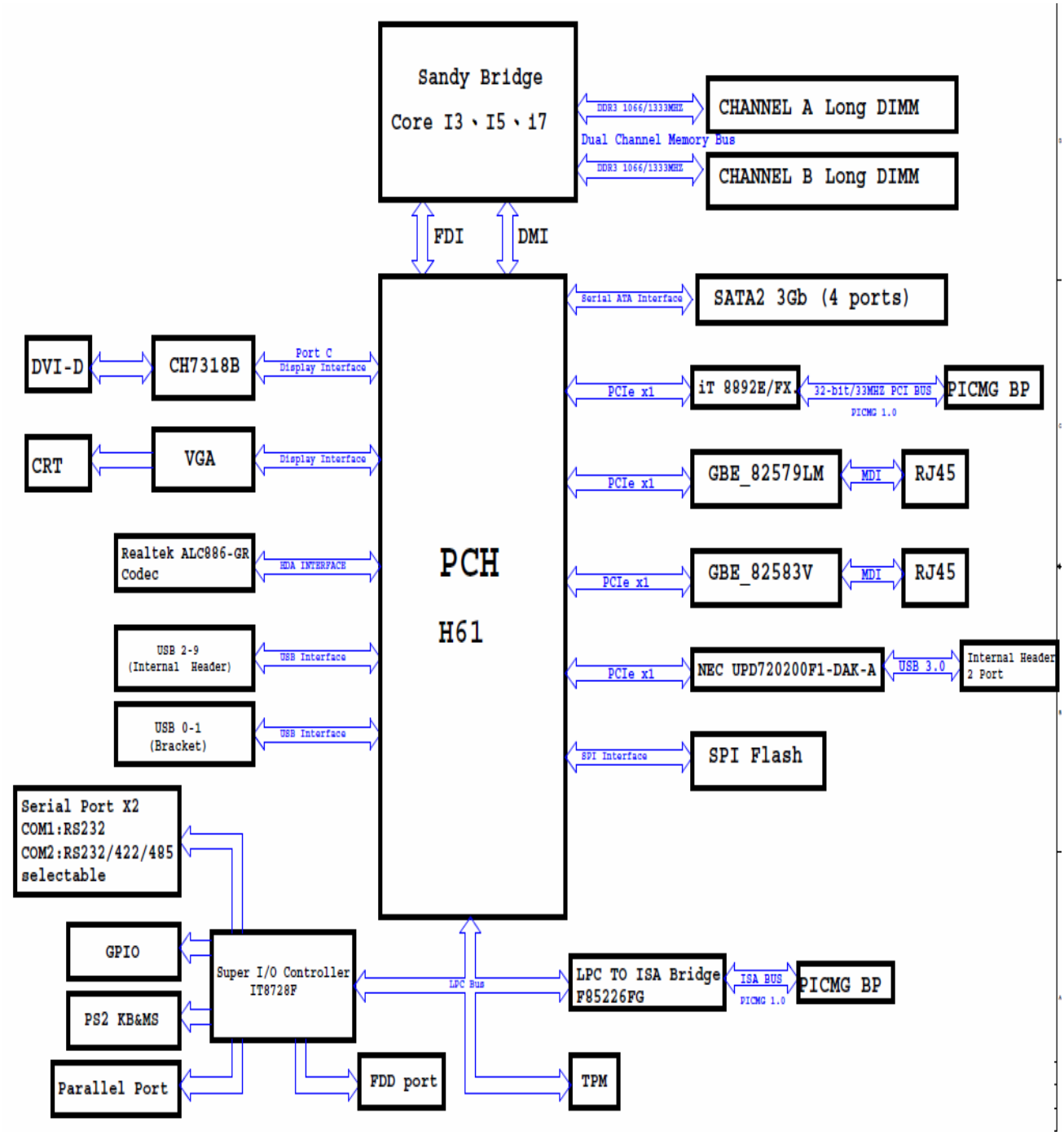
- **Operating Temperature:**
  0°C ~ 60°C (23°F ~ 140°F)
- **Storage Temperature:**
  -20°C ~ 80°C
- **Relative Humidity:**
  5% ~ 90%, non-condensing

1.3.1 Mechanical Drawing



1.4 System Architecture

All of details operating relations are shown in ROBO-8780VG2A series System Block Diagram.



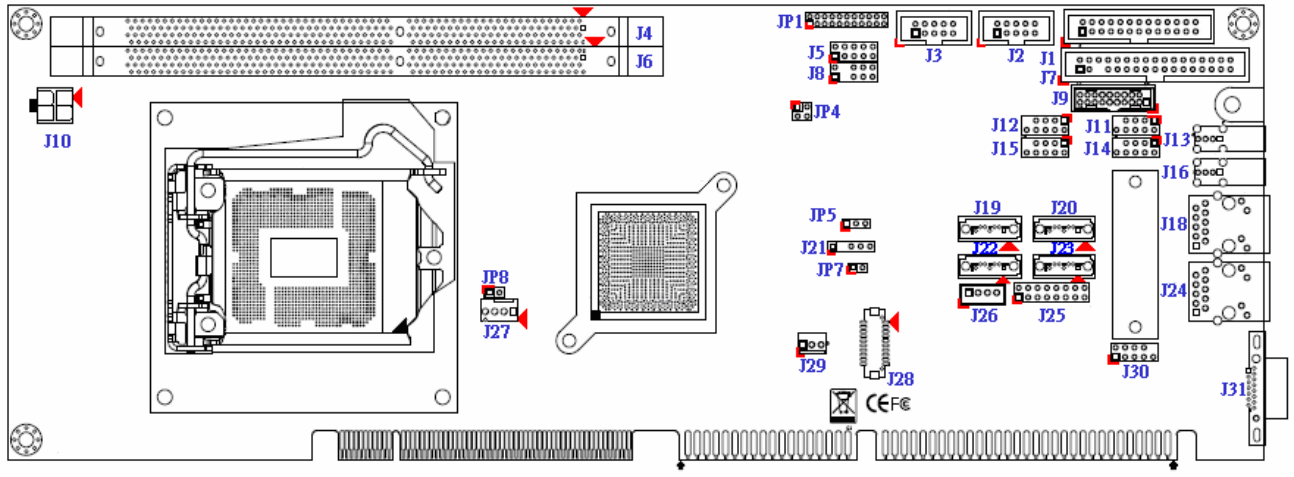
ROBO-8780VG2A series System Block Diagram

Chapter 2
Hardware Configuration

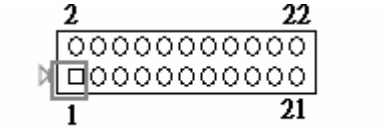
This chapter gives the definitions and shows the positions of jumpers, headers and connectors. All of the configuration jumpers on ROBO-8780VG2A are in the proper position. The default settings shipped from factory are marked with an asterisk ( ).

2.1 Jumper Setting

In general, jumpers on the single board computer are used to select options for certain features. Some of the jumpers are designed to be user-configurable, allowing for system enhancement. The others are for testing purpose only and should not be altered. To select any option, cover the jumper cap over (SHORT) or remove (NC) it from the jumper pins according to the following instructions. Here NC stands for "Not Connect".



JP1: COM2 (J2) Interface Selection



PIN NO.	Function
5-6, 9-11, 10-12, 15-17, 16-18 Short	RS-232 ★
3-4, 7-9, 8-10, 13-15, 14-16, 21-22 Short	RS-422
1-2, 7-9, 8-10, 19-20 Short	RS-485

JP4: AT Mode Select(JP7 Must 1-2 Short)

PIN NO.	Signal Description
1-3、2-4 Short	AT Mode
1-3、2-4 open	ATX Mode ★

JP5: CMOS Clear

PIN NO.	Function
1-2 Short	Normal Operation ★
2-3 Short	Clear CMOS Contents

JP7:ATX/ ATX emulation AT Mode Select

PIN NO.	Signal Description
1-2 Short	ATX emulation AT mode
1-2 Open	ATX Mode ★

JP8: VCCSA Voltage Selection

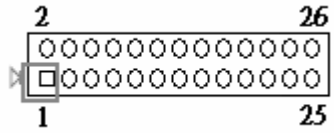
PIN NO.	Function
1-2 Short	0.85 V
1-2 Open	0.925V ★

2.2 Connector Allocation

I/O peripheral devices and Flash disk will be connected to these interface connectors

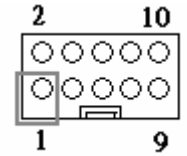
CONNECTOR	FUNCTION	REMARK
J1	Parallel Port Connector	
J2	COM2 Serial Port 2 Connector	
J3	COM1 Serial Port 1 Connector	
J4 / J6	DDR3 Long DIMM SLOT	
J5	General Purpose I/O Connector	
J7	Floppy Connector	
J8	External PS/2 Keyboard/Mouse Connector	
J9	USB 3.0 Connector	
J10	+12V Power Connector	
J11/J12/J14/J15	Internal USB Connector	
J13/J16	External USB Connector	
J19/J20/J22/J23	SATA 2 Connector	
J21	SMBus Connector	
J18	Ethernet RJ-45 Connector (LAN 2)82583V	
J24	Ethernet RJ-45 Connector (LAN 1)82579LM	
J29	FAN 1 (SYSTEM FAN) Power Connector	
J27	FAN 2 (CPU FAN) Power Connector	
J25	Front Panel Pin HDR	
J28	DVI Connector	
J31	VGA Connector	
J30	Audio MIC/Line-in/Line-out Connector	
J26	ATX PWROK Connector	

J1: Parallel Port Connector



PIN No.	Signal Description	PIN No.	Signal Description
1	Strobe#	2	Auto Form Feed#
3	Data0	4	Error#
5	Data1	6	Initialization#
7	Data2	8	Printer Select IN#
9	Data3	10	Ground
11	Data4	12	Ground
13	Data5	14	Ground
15	Data6	16	Ground
17	Data7	18	Ground
19	Acknowledge#	20	Ground
21	Busy	22	Ground
23	Paper Empty	24	Ground
25	Printer Select	26	NC

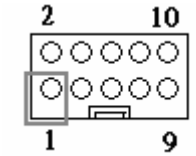
J2 : COM2 Serial Port Connector



PIN No	Signal Description		
	RS-232	RS-422	RS-485
1	DCD (Data Carrier Detect)	TX-	DATA-
2	DSR (Data Set Ready)	N/C	N/C
3	RXD (Receive Data)	TX+	DATA+
4	RTS (Request to Send)	N/C	N/C
5	TXD (Transmit Data)	RX+	N/C
6	CTS (Clear to Send)	N/C	N/C
7	DTR (Data Terminal Ready)	RX-	N/C
8	RI (Ring Indicator)	N/C	N/C
9	GND (Ground)	GND	GND
10	N/C	N/C	N/C

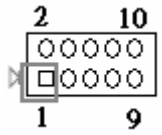
Note:
J2 (COM2) could be configurable as RS-232/422/485 with jumper JP1.

J3: COM1 Serial Port Connector



PIN No.	Signal Description
1	DCD
2	DSR
3	RXD
4	RTS
5	TXD
6	CTS
7	DTR
8	RI
9	Ground
10	N/C

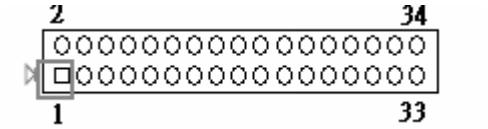
J5: General Purpose I/O Connector



PIN No.	Signal Description	PIN No.	Signal Description
1	GPIO0	2	GPIO4
3	GPIO1	4	GPIO5
5	GPIO2	6	GPIO6
7	GPIO3	8	GPIO7
9	Ground	10	+5V

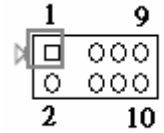
Note:
All General Purpose I/O ports can only apply to standard TTL ± 5% signal level (0V/5V), and each Fan.

J7:Floppy Interface



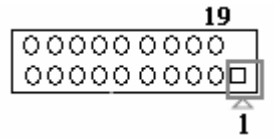
PIN No.	Signal Description	PIN No.	Signal Description
1	Ground	2	Density Select
3	Ground	4	N/C
5	N/C	6	N/C
7	Ground	8	Index#
9	Ground	10	Motor ENA#
11	Ground	12	N/C
13	Ground	14	Drive Select A#
15	Ground	16	N/C
17	Ground	18	Direction#
19	Ground	20	Step#
21	Ground	22	Write Data#
22	Ground	24	Write Gate#
23	Ground	26	Track 0#
25	Ground	28	Write Protect#
27	N/C	30	Read Data#
29	N/C	30	Read Data#
31	Ground	32	Head Select#
33	N/C	34	Disk Change#

J8: External PS/2 Keyboard/Mouse Connector



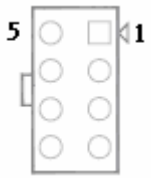
PIN No.	Signal Description	PIN No.	Signal Description
1	Mouse Data	2	Keyboard Data
3	N/C	4	N/C
5	Ground	6	Ground
7	PS2 Power	8	PS2 Power
9	Mouse Clock	10	Keyboard Clock

J9: USB 3.0 Connector



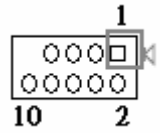
PIN No.	Signal Description	PIN No.	Signal Description
1	VCC	11	D2+
2	SSRX1-	12	D2-
3	SSRX1+	13	GND
4	GND	14	SSTX2+
5	SSTX1-	15	SSTX2-
6	SSTX1+	16	GND
7	GND	17	SSRX2+
8	D1-	18	SSRX2-
9	D1+	19	VCC
10	GND		

J10: +12V POWER Connector



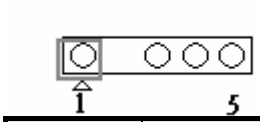
PIN No.	Signal Description
1、2	Ground
3、4	Ground
5、6	+12V
7、8	+12V

J11/J12/J14/J15: External USB Connector



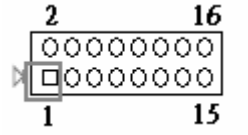
PIN No.	Signal Description	PIN No.	Signal Description
1	5V Dual	2	5V Dual
3	USB-	4	USB-
5	USB+	6	USB+
7	Ground	8	Ground
9	Key(no pin)	10	N/C

J21:SMBUS Connector



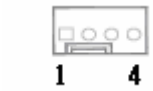
PIN No.	Signal Description
1	SMBus_CLK
2	N/C
3	Ground
4	SMBus_DAT
5	+5V

J25:Front Panel Pin HDR



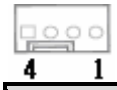
PIN No.	Signal Description	PIN No.	Signal Description
1	POWER_LED(+)	2	Speaker(+)
3	POWER_LED(-)	4	N/C
5	J24 LAN1_LINK(+)	6	N/C
7	J24 LAN1_LINK(-)	8	Speaker(-)
9	J18 LAN2_LINK(-)	10	GND
11	J18 LAN2_LINK(+)	12	POWER BUTTON
13	HDD_LED(+)	14	RESET BUTTON
15	HDD_LED(-)	16	GND

J26: ATX PWROK Connector



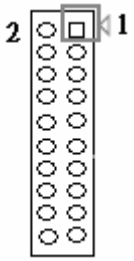
PIN No.	Signal Description
1	ATX_PWROK
2	+5VSB
3	PS_ON
4	GND

J27: CPU Fan Connector



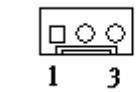
PIN No.	Signal Description
1	Ground
2	+12V
3	Fan on/off output
4	Fan Speed control

J28: DVI Connector



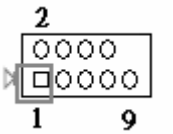
PIN No.	Signal Description	PIN No.	Signal Description
1	GND	11	D1-
2	GND	12	VCC
3	D2+	13	GND
4	D3+	14	HPDET
5	D2-	15	D0+
6	D3-	16	DDC_CLK
7	GND	17	D0-
8	GND	18	DDC_DATA
9	D1+	19	GND
10	VCC	20	GND

J29: System Fan Connector



PIN No.	Signal Description
1	Ground
2	Fan speed control
3	Fan on/off output

J30: Audio MIC/Line-in/Line-out Connector



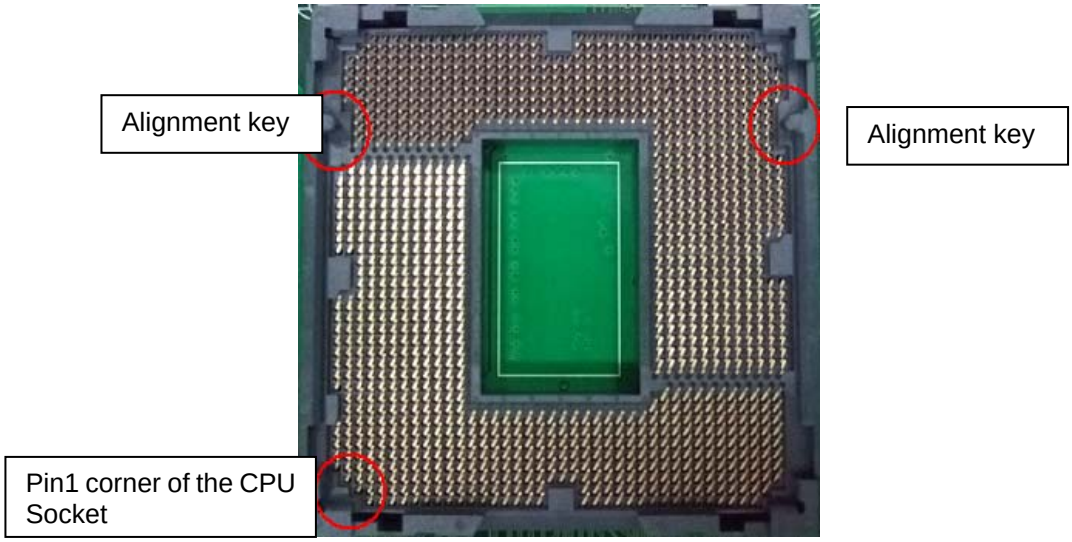
PIN No.	Signal Description	PIN No.	Signal Description
1	MIC with Reference Voltage	2	Analog Ground
3	Line-in Left Channel	4	Analog Ground
5	Line-in Right Channel	6	Analog Ground
7	Line-out Left Channel	8	Analog Ground
9	Line-out Right Channel	10	N/C

Chapter 3
System Installation

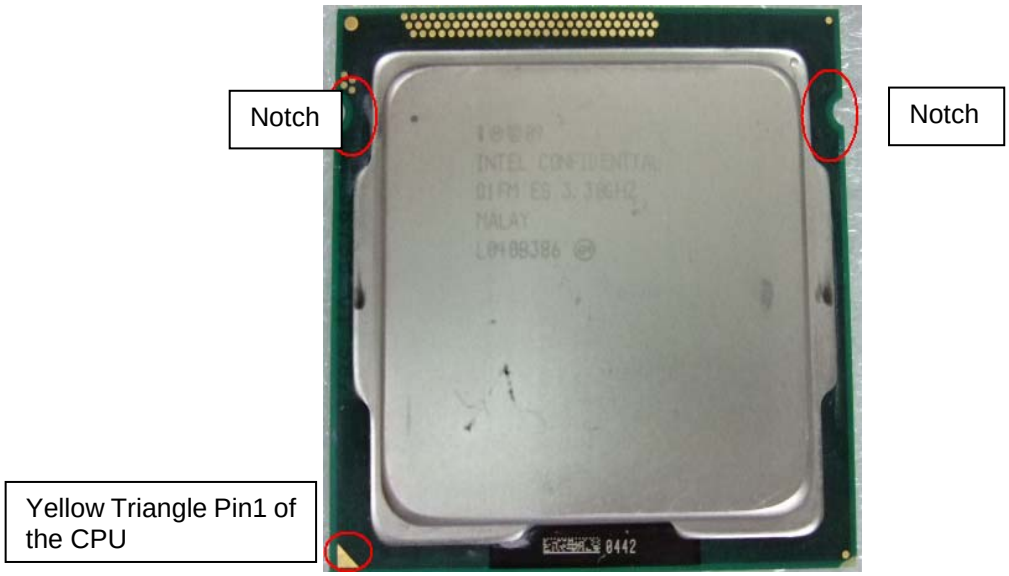
This chapter provides you with instructions to set up your system. The additional information is enclosed to help you set up onboard PCI device and handle Watch Dog Timer (WDT) and operation of GPIO in software programming.

3.1 Intel LGA-1155 Processor

LGA-1155 CPU Socket



LGA-1155 CPU.

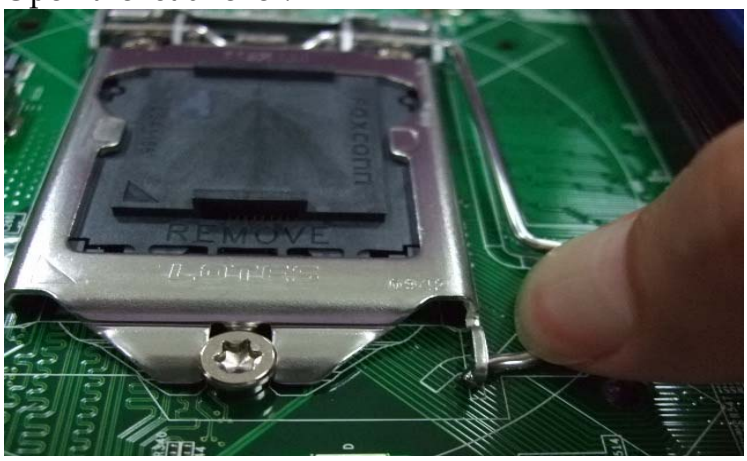


Please remember to locate the alignment keys on the CPU socket of the motherboard and the notches on the CPU

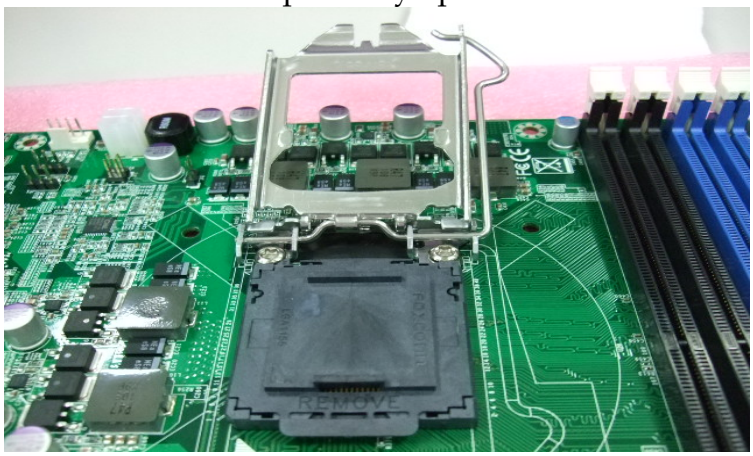
LGA-1155 CPU Installation Steps

Before install the CPU, please make sure to turn off the power first!!

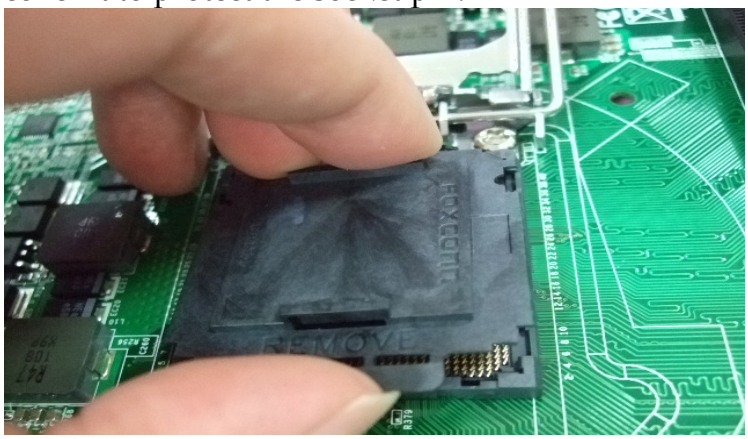
1. Open the load lever.



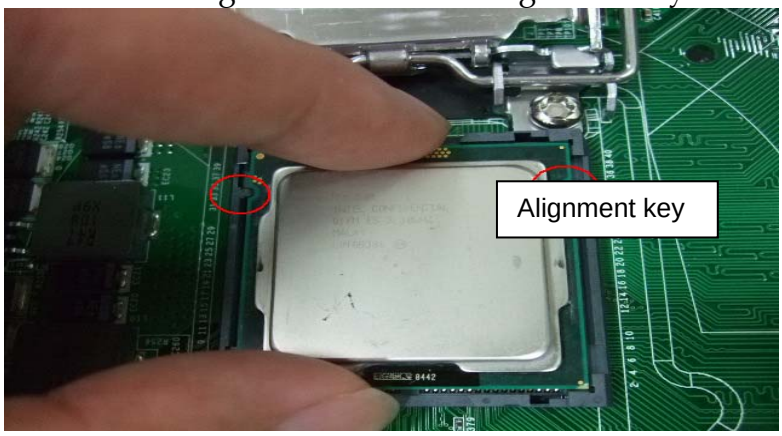
2. Lift the load lever up to fully open.



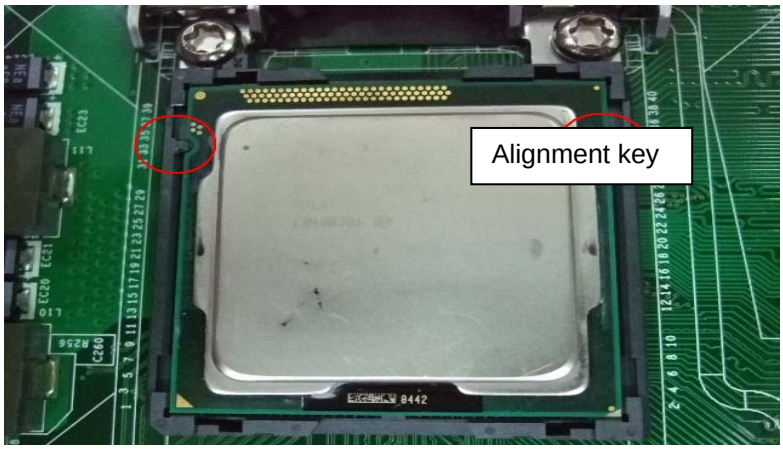
3. Remove the plastic cap on the CPU socket. Before you install the CPU, always cover it to protect the socket pin.



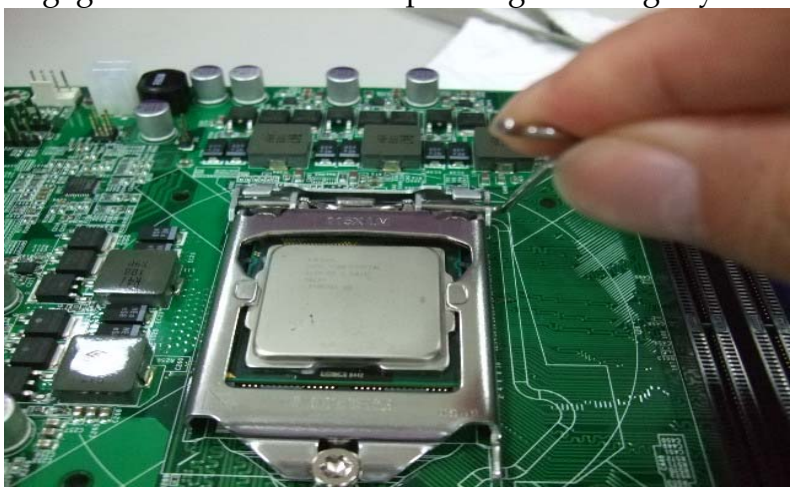
4. After confirming the CPU direction for correct mating, put down the CPU in the socket housing frame. Note that alignment keys are matched.



5. Make sure the CPU has been seated well into the socket. If not, take out the CPU and reinstall.



6. Engage the load lever while pressing down lightly onto the load plate.



7. Push the CPU socket lever back into its locked position.

8. Please make sure four hooks are in proper position before you install the cooler.

3.2 Main Memory

ROBO-8780VG2A provide 2 x240 pin DIMM sockets (Dual Channel) which supports Dual channel 1066/1333 DDR3-SDRAM as main memory, Non-ECC (Error Checking and Correcting), non-register functions. The maximum memory can be up to 16GB. Memory clock and related settings can be detected by BIOS via SPD interface.

For system compatibility and stability, do not use memory module without brand. Memory configuration can be set to either one double-sided DIMM in one DIMM socket or two single-sided DIMM in both sockets.

Beware of the connection and lock integrity from memory module to socket. Inserting improperly it will affect the system reliability.

Before locking, make sure that all modules have been fully inserted into the card slots.

Note:
To insure the system stability, please do not change any of DRAM parameters in BIOS setup to modify system the performance without acquired technical information.

3.3 Installing the Single Board Computer

To install your ROBO-8780VG2A into standard chassis or proprietary environment, please perform the following:

Step 1 : Check all jumpers setting on proper position
Step 2 : Install and configure CPU and memory module on right position
Step 3 : Place ROBO-8780VG2A into the dedicated position in the system
Step 4 : Attach cables to existing peripheral devices and secure it

WARNING
Please ensure that SBC is properly inserted and fixed by mechanism.

Note:
Please refer to section 3.3.1 to 3.3.5 to install INF/VGA/LAN/Audio/USB3.0 drivers.

3.3.1 Intel® BD82H61 PCH Chipset

ROBO-8780VG2A uses Intel BD82H61 PCH chipset. It's a new chipset that some old operating systems might not be able to recognize. To overcome this compatibility issue, for Windows operating systems such as Windows XP, please install its INF before any of other Drivers are installed. You can find very easily this chipset component driver in ROBO-8780VG2A CD-title.

3.3.2 Intel® Core i processors integrated Graphics Engine

ROBO-8780VG2A uses Intel® Core i processors integrated graphic engine to gain an outstanding graphic performance. ROBO-8780VG2A supports CRT & DVI-D dual display. This combination makes ROBO-8780VG2A an excellent piece of multimedia hardware.

Please find the Graphic drivers in the ROBO-8780VG2A CD-title. Drivers support Windows XP/Win7.

3.3.3 Intel® Gigabit Ethernet Controller

Please find Intel 82579LM and 82583V LAN drivers in /Ethernet directory of ROBO-8780VG2A CD-title. The drivers support Windows XP/Win7.

3.3.4 Audio Controller

Please find Realtek ALC886-GR (High Definition Audio driver) form ROBO-8780VG2A CD-title. The drivers support Windows XP/Win7.

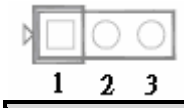
3.3.5 USB3.0 Controller

Please find NEC USB3.0 host driver (xHCI driver) from ROBO-8780VG2A CD-title. The drivers support Windows XP/Win7.

3.4 Clear CMOS Operation

The following table indicates how to enable/disable Clear CMOS Function hardware circuit by putting jumpers at proper position.

JP5: CMOS Clear



PIN NO.	Function
1-2 Short	Normal Operation
2-3 Short	Clear CMOS Contents

3.5 WDT Function

The working algorithm of the WDT function can be simply described as a counting process. The Time-Out Interval can be set through software programming. The availability of the time-out interval settings by software or hardware varies from boards to boards.

ROBO-8780VG2A allows users control WDT through dynamic software programming. The WDT starts counting when it is activated. It sends out a signal to system reset or to non-maskable interrupt (NMI), when time-out interval ends. To prevent the time-out interval from running out, a re-trigger signal will need to be sent before the counting reaches its end. This action will restart the counting process. A well-written WDT program should keep the counting process running under normal condition. WDT should never generate a system reset or NMI signal unless the system runs into troubles. The related Control Registers of WDT are all included in the following sample program that is written in C language. User can fill a non-zero value into the Time-out Value Register to enable/refresh WDT. System will be reset after the Time-out Value to be counted down to zero. Or user can directly fill a zero value into Time-out Value Register to disable WDT immediately. To ensure a successful accessing to the content of desired Control Register, the sequence of following program codes should be step-by-step run again when each register is accessed. Additionally, there are maximum 2 seconds of counting tolerance that should be considered into user' application program. For more information about WDT, please refer to **IT8728F/CXS** data sheet.

There are two PNP I/O port addresses that can be used to configure WDT,
1) 0x2E:EFIR (Extended Function Index Register, for identifying CR index number)
2) 0x2F:EFDR (Extended Function Data Register, for accessing desired CR)
Below are some example codes, which demonstrate the use of WDT.

```
#include <stdio.h>
#include <conio.h>
#include <dos.h>

#define SIO_Port0x2E
#defineSIO_Port20x4E
#define GPIO_LDN0x07

void Enter_IT872x_SIO() {
outportb(SIO_Port, 0x87);
outportb(SIO_Port, 0x01);
outportb(SIO_Port, 0x55);
outportb(SIO_Port, 0x55);

}

void Set_LDN(unsigned char LDN) {
outportb(SIO_Port, 0x07);
outportb(SIO_Port+1, LDN);
printf("LDN=%x\n", LDN);
}

void Set_Register(unsigned char offset, unsigned char value) {
outportb(SIO_Port, offset);
outportb(SIO_Port+1, value);
printf("Write offset:%x = %x\n", offset, value);
}

int main(void) {

printf("test string\n");
Enter_IT872x_SIO();
Set_LDN(GPIO_LDN);

Set_Register(0x72, 0xC0);
Set_Register(0x73, 0x05);
printf("System will reset in 5 seconds\n");

return 0;
}
```

3.6 GPIO

The ROBO-8780VG2A provides 8 programmable input or output ports that can be individually configured to perform a simple basic I/O function. Users can configure each individual port to become an input or output port by programming register bit
of I/O Selection. To invert port value, the setting of Inversion Register has to be made. Port values can be set to read or write through Data Register.
J5: General Purpose I/O Connector

PIN No.	Signal Description	PIN No.	Signal Description
1	GPIO0	2	GPIO4
3	GPIO1	4	GPIO5
5	GPIO2	6	GPIO6
7	GPIO3	8	GPIO7
9	Ground	10	+5V

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>

#define SIO_Port0x2E
#defineSIO_Port20x4E
#define GPIO_LDN0x07
#define GPIO_Base0x0A00

//Enter SIO
void Enter_IT872x_SIO() {
outp(SIO_Port, 0x87);
outp(SIO_Port, 0x01);
outp(SIO_Port, 0x55);
outp(SIO_Port, 0x55);

}

//Select LDN
void Set_LDN(unsigned char LDN) {
outp(SIO_Port, 0x07);
outp(SIO_Port+1, LDN);
//printf("LDN=%x\n", LDN);
}

//Set register offset to Value
void Set_Register(unsigned char offset, unsigned char value) {
outp(SIO_Port, offset);
outp(SIO_Port+1, value);
```

```
//printf("Write offset:%x = %x\n", offset, value);
}

//Or register
void Or_Register(unsigned char offset, unsigned char value) {
outp(SIO_Port, offset);
outp(SIO_Port+1, inp(SIO_Port+1) | value);
//printf("Write offset:%x = %x\n", offset, value);
}

//And register
void And_Register(unsigned char offset, unsigned char value) {
outp(SIO_Port, offset);
outp(SIO_Port+1, inp(SIO_Port+1) & value);
//printf("Write offset:%x = %x\n", offset, value);
}
int main(void) {

int result;
printf("ROBO-8780 GPIO Test:\n");

//pin1 =11
//pin3 =12
//pin5 =47
//pin7 =50


//pin2 =14
//pin4 =35
//pin6 =36
//pin8 =37


Enter_IT872x_SIO();
Set_LDN(GPIO_LDN);

//Enable GPIO
//Or_Register(0xC0,0x46)//11,12,14
//Or_Register(0xC2,0xE0)//35,36,37
//Or_Register(0xC3,0x80)//47
//Or_Register(0xC4,0x01)//50

//Set Output
Or_Register(0xC8,0x06);//11,12
Or_Register(0xCB,0x80);//47
Or_Register(0xCC,0x01);//50
```

```
//Set Input
And_Register(0xC8,0xEF);//14
And_Register(0xCA,0x1F);//35,36,37

//output high
outp(GPIO_Base+0,0x06);//11,12
outp(GPIO_Base+3,0x80);//47
outp(GPIO_Base+4,0x01);//50

result=1;
if ((inp(GPIO_Base+0)&0x10)!=0x10) result=0;
if ((inp(GPIO_Base+2)&0xE0)!=0xE0) result=0;

if (result==0){

printf("Test fail!!\n");

return 1;
}


//output low
outp(GPIO_Base+0,inp(GPIO_Base+0)&0xF9);//11,12
outp(GPIO_Base+3,inp(GPIO_Base+3)&0x7F);//47
outp(GPIO_Base+4,inp(GPIO_Base+4)&0xFE);//50

result=1;
if ((inp(GPIO_Base+0)&0x10)!=0x00) result=0;
if ((inp(GPIO_Base+2)&0xE0)!=0x00) result=0;

if (result==0){

printf("Test fail!!\n");
return 1;

}

////////////////////////////////////////////////

//Set Input
And_Register(0xC8,0xF9);//11,12
And_Register(0xCB,0x7F);//47
And_Register(0xCC,0xFE);//50

//Set output
```

```
Or_Register(0xC8,0x10);//14
Or_Register(0xCA,0xE0);//35,36,37

//output high
outp(GPIO_Base+0,0x10);//14
outp(GPIO_Base+2,0xE0);//35,36,37

result=1;
if ((inp(GPIO_Base+0)&0x06)!=0x06) result=0; //11,12
if ((inp(GPIO_Base+3)&0x80)!=0x80) result=0; //47
if ((inp(GPIO_Base+4)&0x01)!=0x01) result=0; //50

if (result==0){

printf("Test fail!!\n");

return 1;
}

//output low
outp(GPIO_Base+0,inp(GPIO_Base+0)&0xEF);//14
outp(GPIO_Base+2,inp(GPIO_Base+2)&0x1F);//35,36,37

result=1;
if ((inp(GPIO_Base+0)&0x06)!=0x00) result=0; //11,12
if ((inp(GPIO_Base+3)&0x80)!=0x00) result=0; //47
if ((inp(GPIO_Base+4)&0x01)!=0x00) result=0; //50

if (result==0){

printf("Test fail!!\n");
return 1;

}

//getchar ();

printf("Test Pass!!\n");
return 1;
```

Chapter 4
BIOS Setup Information

ROBO-8780VG2A uses AMI BIOS structure stored in Flash ROM. These BIOS has a built-in Setup program that allows users to modify the basic system configuration easily. This type of information is stored in CMOS RAM so that it is retained during power-off periods. When system is turned on, ROBO-8780VG2A communicates with peripheral devices and checks its hardware resources against the configuration information stored in the CMOS memory. If any error is detected, or the CMOS parameters need to be initially defined, the diagnostic program will prompt the user to enter the SETUP program. Some errors are significant enough to abort the start up.

4.1 Entering Setup -- Launch System Setup

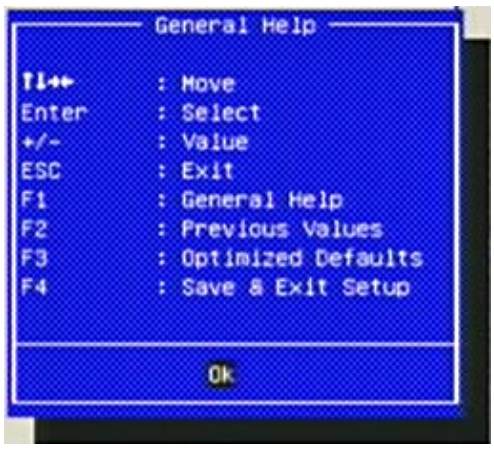
Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <Del>or <F2> key will enter BIOS setup screen.

Press <Del>or <F2> to enter SETUP

If the message disappears before responding and still wish to enter Setup, please restart the system by turning it OFF and On or pressing the RESET button. It can be also restarted by pressing <Ctrl>, <Alt>, and <Delete> keys on keyboard simultaneously.

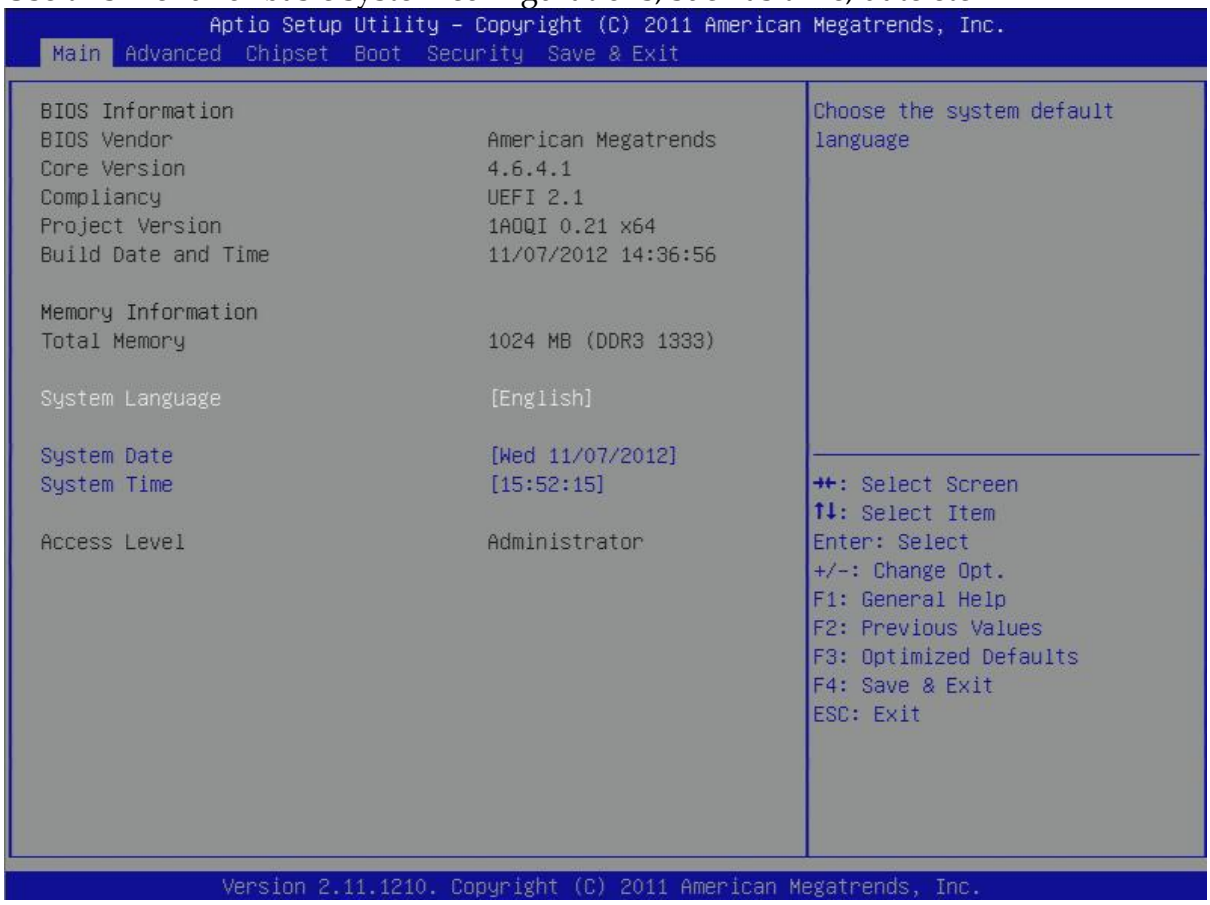
Press <F1> to Run SETUP or Resume

The BIOS setup program provides a General Help screen. The menu can be easily called up from any menu by pressing <F1>. The Help screen lists all the possible keys to use and the selections for the highlighted item. Press <Esc> to exit the Help screen.



4.2 Main

Use this menu for basic system configurations, such as time, date etc


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Main Advanced Chipset Boot Security Save & Exit
BIOS Information
BIOS Vendor American Megatrends
Core Version 4.6.4.1
Compliancy UEFI 2.1
Project Version 1AOQI 0.21 x64
Build Date and Time 11/07/2012 14:36:56
Memory Information
Total Memory 1024 MB (DDR3 1333)
System Language [English]
System Date [Wed 11/07/2012]
System Time [15:52:15]
Access Level Administrator
Choose the system default language
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.

BIOS Information, Memory Information
These items show the firmware and memory specifications of your system. Read only.

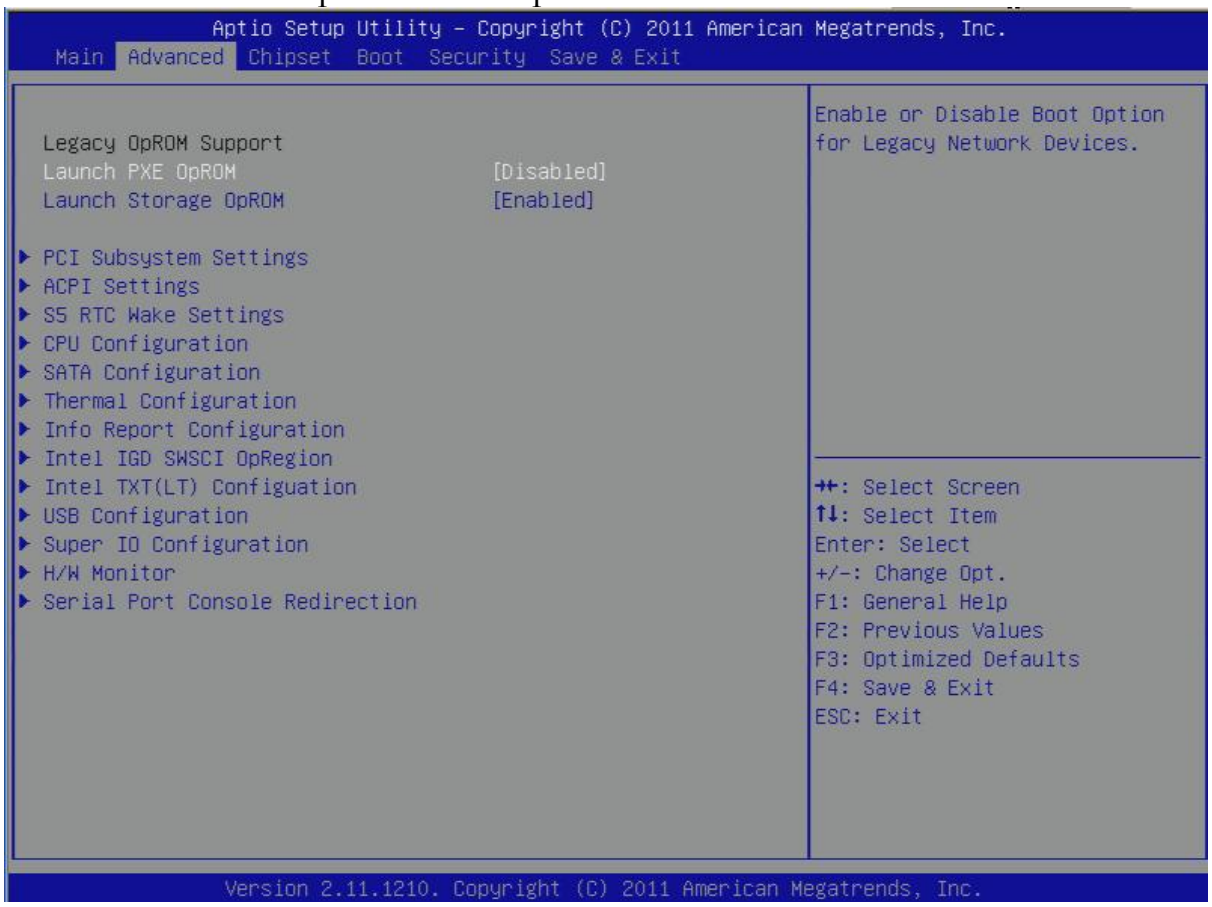
System Language
Choose the system default language.
Choices: English.

System Date
The date format is <Day>, <Month> <Date> <Year>. Use [+] or [−] to configure system Date.

System Time
The time format is <Hour> <Minute> <Second>. Use [+] or [−] to configure system Time.

4.3 Advanced

Use this menu to set up the items of special enhanced features



Launch PXE OpROM

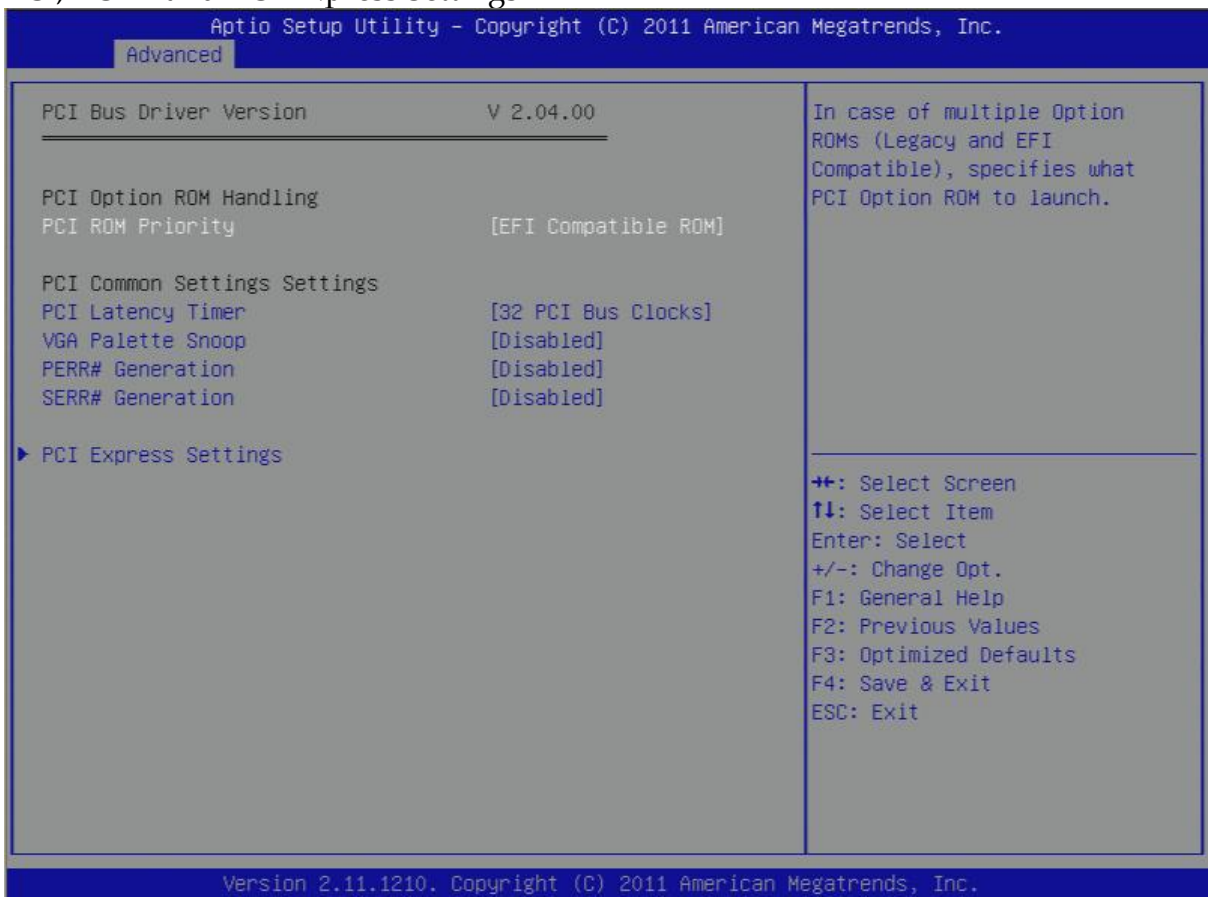
Enable or Disable Boot Option for Legacy Network Devices.
Choices: Disabled, Enabled.

Launch Storage OpROM

Enable or Disable Boot Option for Legacy Mass Storage devices with Option ROM.
Choices: Disabled, Enabled.

PCI Subsystems Settings

PCI, PCI-X and PCI Express Settings


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
PCI Bus Driver Version V 2.04.00
PCI Option ROM Handling
PCI ROM Priority [EFI Compatible ROM]
PCI Common Settings Settings
PCI Latency Timer [32 PCI Bus Clocks]
VGA Palette Snoop [Disabled]
PERR# Generation [Disabled]
SERR# Generation [Disabled]
PCI Express Settings
In case of multiple Option ROMs (Legacy and EFI Compatible), specifies what PCI Option ROM to launch.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.

PCI ROM Priority

In case of multiple Option ROMs (Legacy and EFI Compatible), specifies what PCO Option ROM to launch.
Choices: Legacy ROM, EFI Compatible ROM.

PCI Latency Timer

Value to be programmed into PCI Latency Timer Register.
Choices: 32 PCI Bus Clocks, 64 PCI Bus Clocks, 96 PCI Bus Clocks, 128 PCI Bus Clocks, 160 PCI Bus Clocks, 192 PCI Bus Clocks, 224 PCI Bus Clocks, 248 PCI Bus Clocks.

VGA Palette Snoop

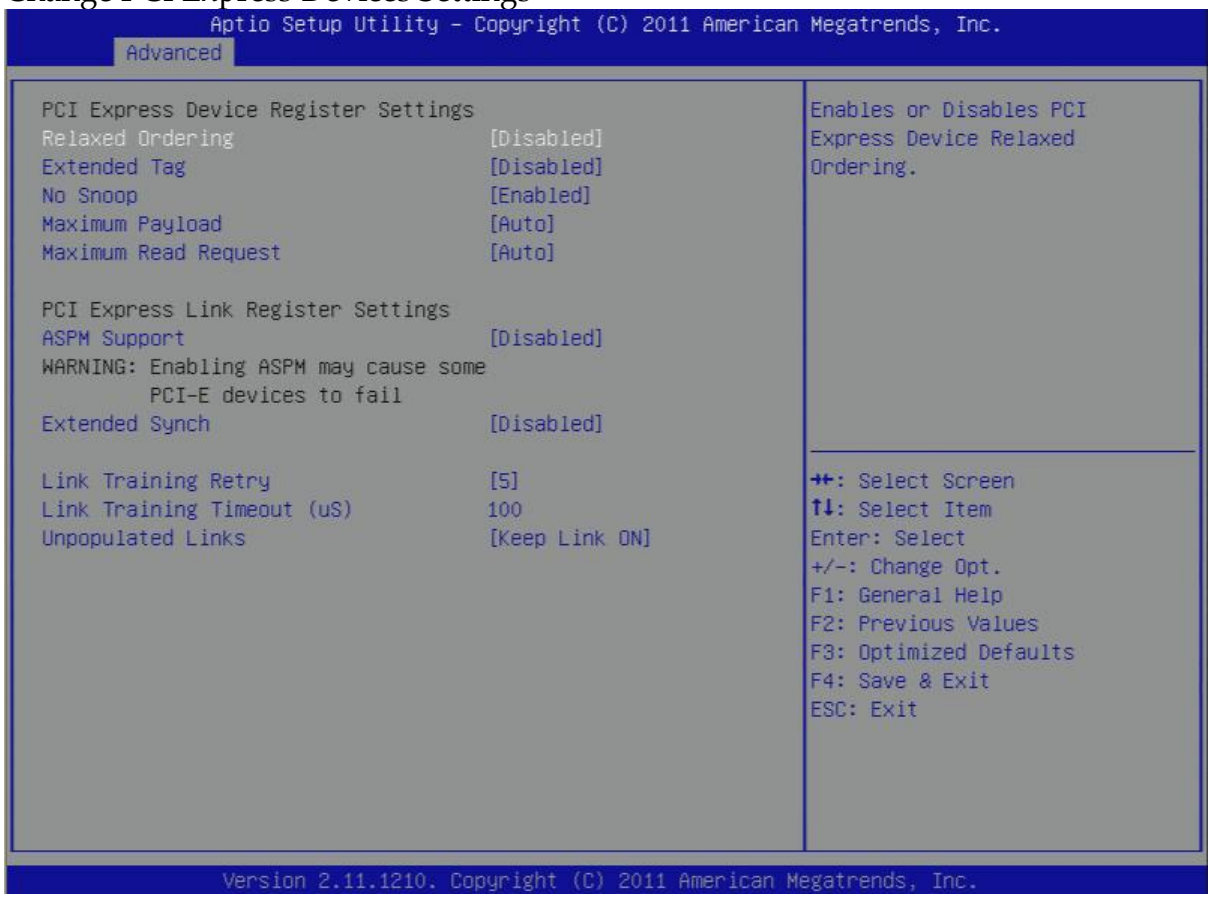
Enables or Disables VGA Palette Registers Snooping.
Choices: Disabled, Enabled.

PERR# Generation

Enables or Disables PCI Device to Generate PERR#.
Choices: Disabled, Enabled.

SERR# Generation
Enables or Disables PCI Device to Generate SERR#.
Choices: Disabled, Enabled.

PCI Express Settings
Change PCI Express Devices Settings


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
PCI Express Device Register Settings
Relaxed Ordering [Disabled]
Extended Tag [Disabled]
No Snoop [Enabled]
Maximum Payload [Auto]
Maximum Read Request [Auto]
PCI Express Link Register Settings
ASPM Support [Disabled]
WARNING: Enabling ASPM may cause some
PCI-E devices to fail
Extended Synch [Disabled]
Link Training Retry [5]
Link Training Timeout (uS) 100
Unpopulated Links [Keep Link ON]
Enables or Disables PCI Express Device Relaxed Ordering.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.

Relaxed Ordering
Enables or Disables PCI Express Device Relaxed Ordering.
Choices: Disabled, Enabled.

Extended Tag
If Enabled allows Device to use 8-bit Tag field as a requester.
Choices: Disabled, Enabled.

No Snoop
Enables or Disables PCI Express Device No Snoop option.
Choices: Disabled, Enabled.

Maximum Payload
Set Maximum Payload of PCI Express Device or allow System BIOS to select the value.
Choices: Auto, 128 Bytes, 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, 4096 Bytes.

Maximum Read Request
Set Maximum Read Request size of PCI Express Device or allow System BIOS to select the value.
Choices: Auto, 128 Bytes, 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, 4096 Bytes.

ASPM Support
Set the ASPM Level: Force L0 – Force all links to L0 State: AUTO – BIOS auto configure: DISABLE – Disables ASPM.
Choices: Disabled, Auto, Force L0s.

Extended Synch
If Enabled allows generation of Extended Synchronization patterns.
Choices: Disabled, Enabled.

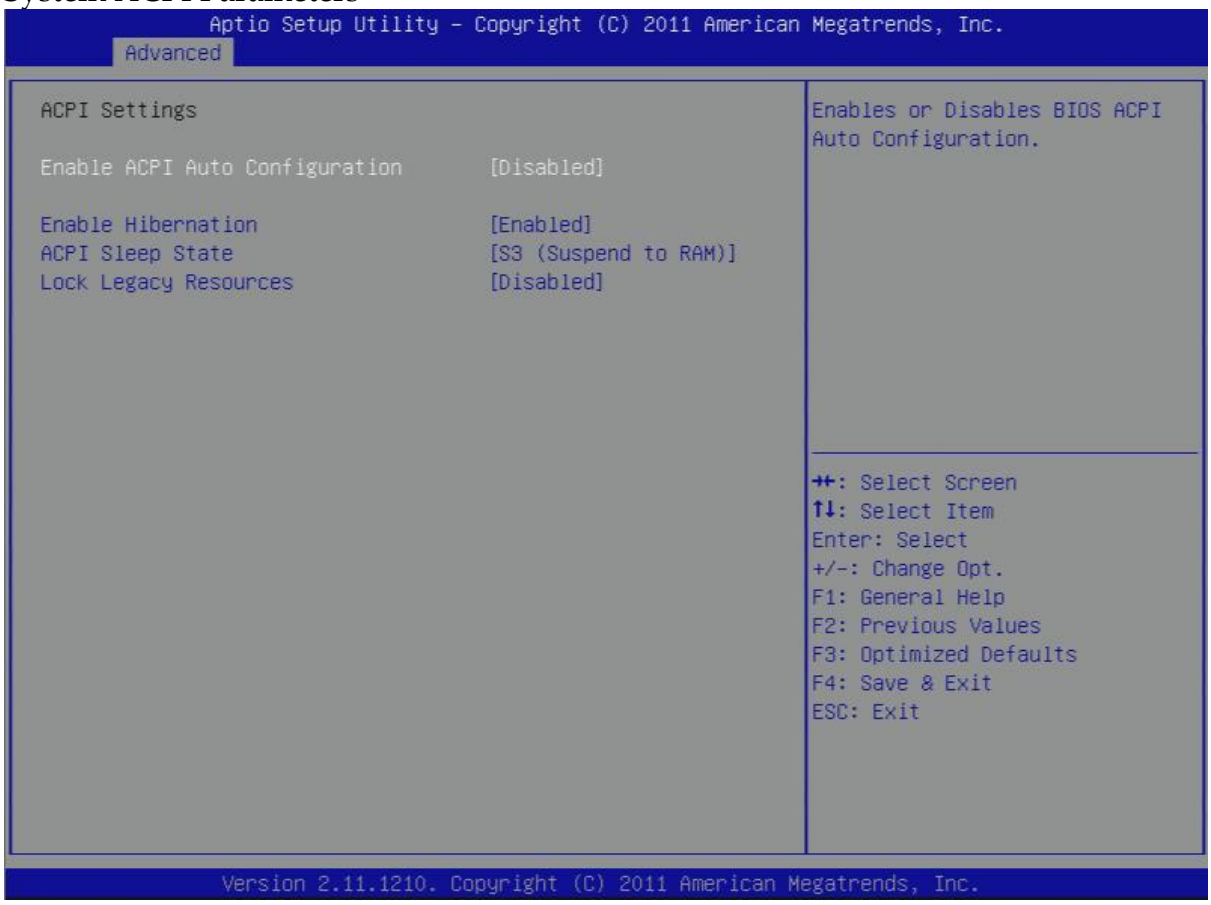
Link Training Retry
Defines number of Retry Attempts software will take to retrain the link if previous training attempt was unsuccessful.
Choices: Disabled, 2, 3, 5.

Link Training Timeout (uS)
Defines number of Microseconds software will wait before polling 'Link Training' bit in Link Status register. Value range from 1 to 100 uS.
Choices: 1 to 100.

Unpopulated Links
In Order to save power, software will disable unpopulated PCI Express links, if this option set to 'Disable Link'.
Choices: Keep Link On, Disable Link.

ACPI Settings

System ACPI Parameters


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
ACPI Settings
Enable ACPI Auto Configuration [Disabled]
Enable Hibernation [Enabled]
ACPI Sleep State [S3 (Suspend to RAM)]
Lock Legacy Resources [Disabled]
Enables or Disables BIOS ACPI Auto Configuration.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.

Enabled ACPI Auto Configuration

Enables or Disables BIOS ACPI Auto Configuration.
Choices: Disabled, Enabled.

Enabled Hibernation

Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
Choices: Disabled, Enabled.

ACPI Sleep State

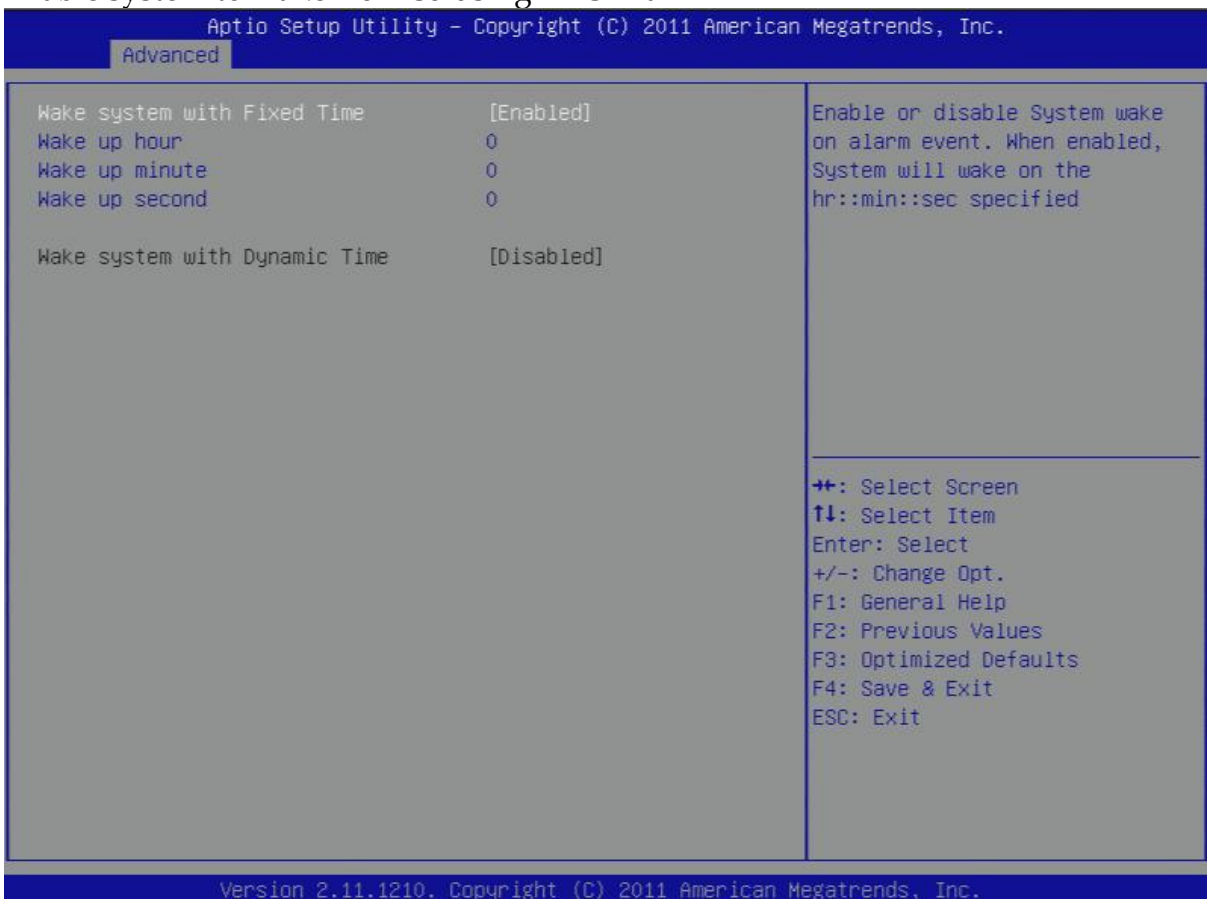
Select the highest ACPI Sleep state the system will enter when the SUSPEND button is pressed.
Choices: Suspend Disabled, S1 (CPU Stop Clock), S3 (Suspend to RAM).

Lock Legacy Resources

Enables or Disables Lock of Legacy Resources.
Choices: Disabled, Enabled.

S5 RTC Wake Settings

Enable system to wake from S5 using RTC Alarm


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
Wake system with Fixed Time [Enabled]
Wake up hour 0
Wake up minute 0
Wake up second 0
Wake system with Dynamic Time [Disabled]
Enable or disable System wake on alarm event. When enabled, System will wake on the hr::min::sec specified
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.

Wake system with Fixed Time

Enable or Disable system wake on alarm event. When enabled, System will wake on the hr::min::sec specified.
Choices: Disabled, Enabled.

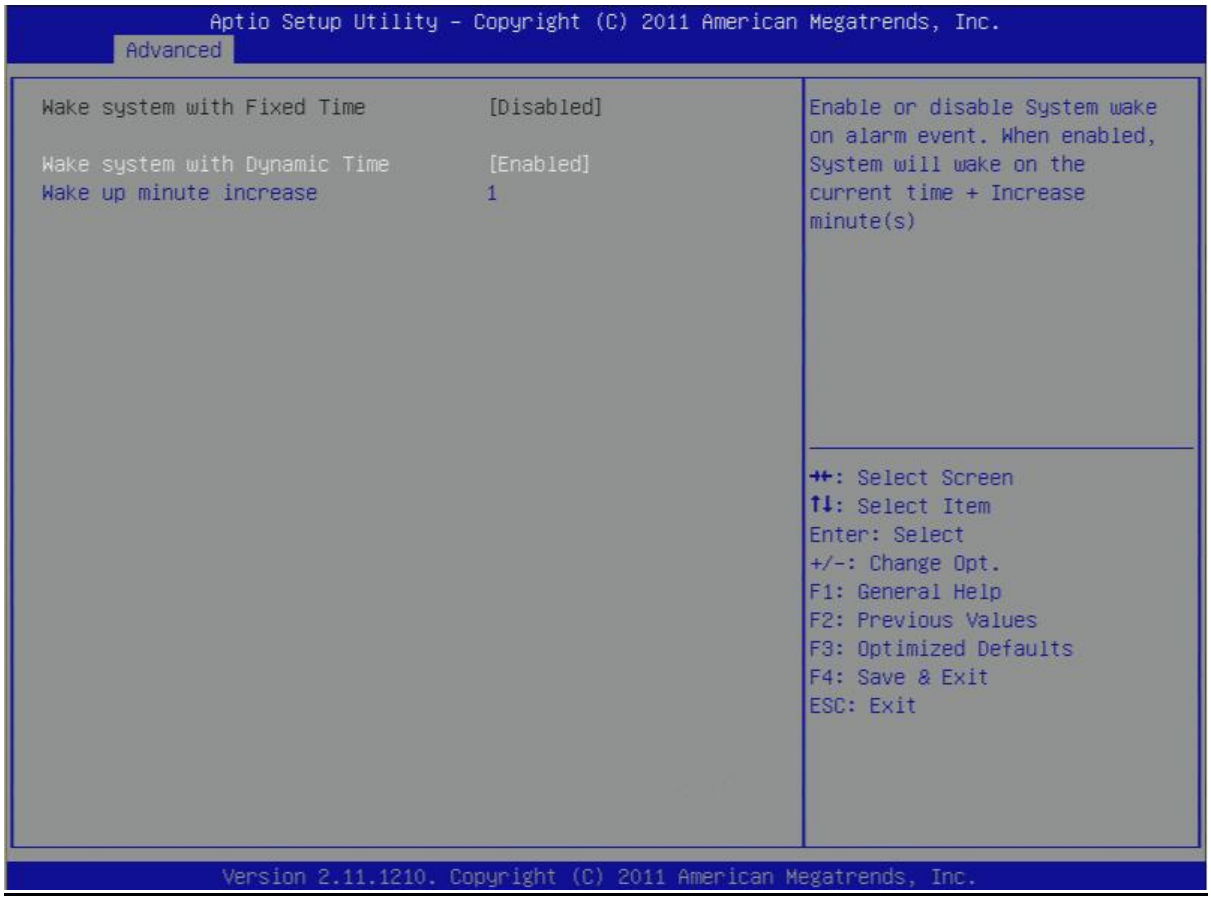
Wake up hour

Select 0-23 for example enter 3 for 3am and 15 for 3pm.
Choices: 0-23.

Wake up minute

Choices: 0-59.

Wake up second
Choices: 0-59.

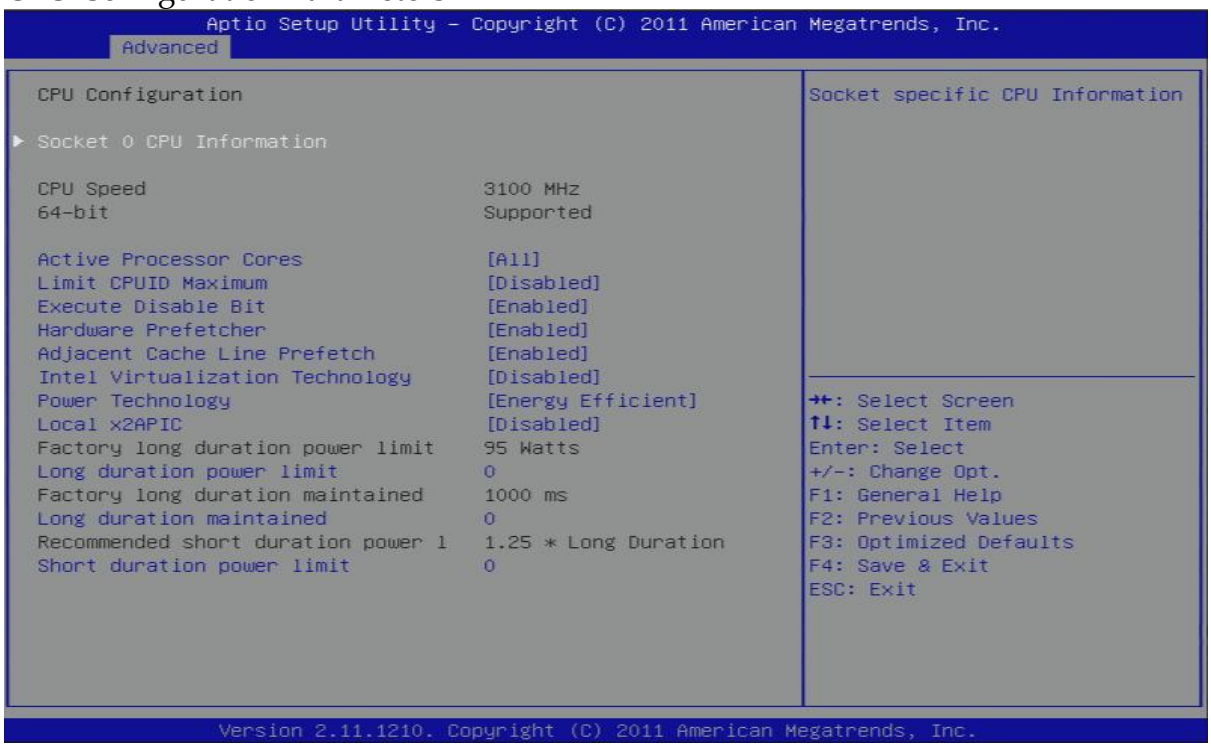

Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
Wake system with Fixed Time [Disabled]
Wake system with Dynamic Time [Enabled]
Wake up minute increase 1
Enable or disable System wake on alarm event. When enabled, System will wake on the current time + Increase minute(s)
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.

Wake system with Dynamic Time
Enable or Disable System wake on alarm event. When enabled, system will wake on the current time + Increase minute(s).
Choices: Disabled, Enabled.

Wake up minute increase
Choices: 1-5.

CPU Configuration

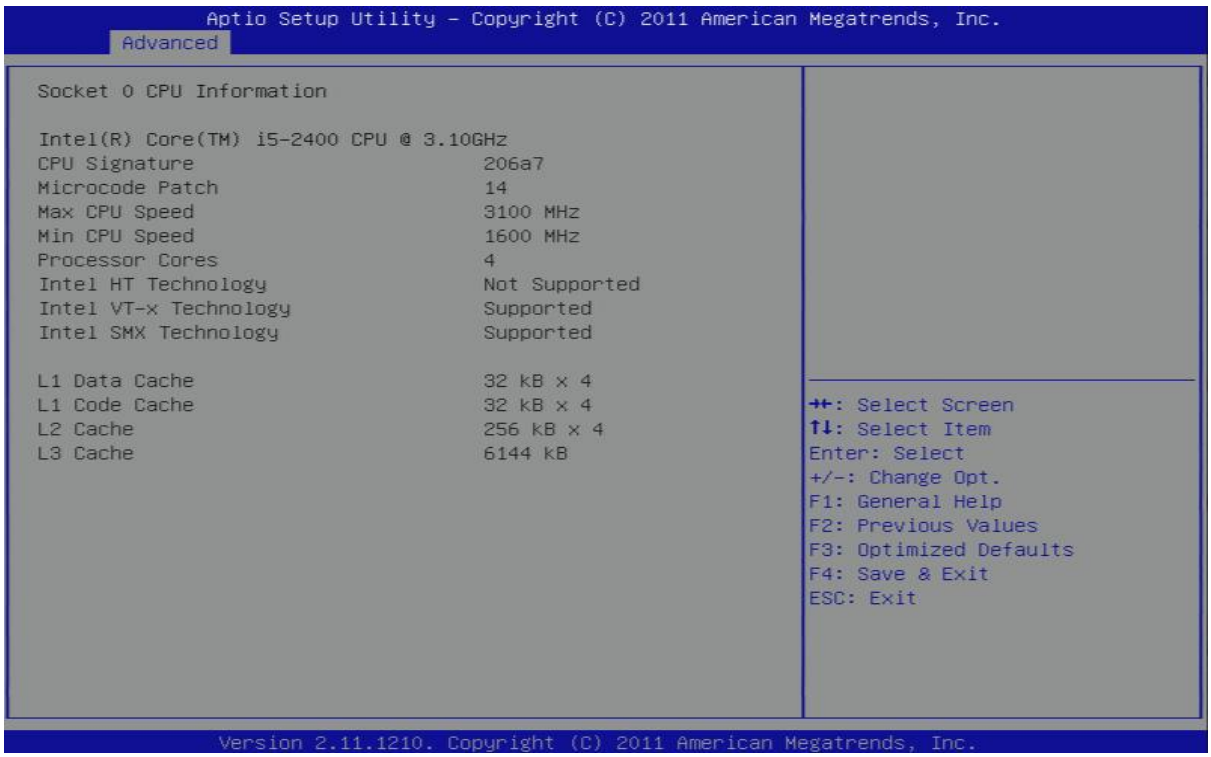
CPU Configuration Parameters


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
CPU Configuration
Socket 0 CPU Information
CPU Speed 3100 MHz
64-bit Supported
Active Processor Cores [All]
Limit CPUID Maximum [Disabled]
Execute Disable Bit [Enabled]
Hardware Prefetcher [Enabled]
Adjacent Cache Line Prefetch [Enabled]
Intel Virtualization Technology [Disabled]
Power Technology [Energy Efficient]
Local x2APIC [Disabled]
Factory long duration power limit 95 Watts
Long duration power limit 0
Factory long duration maintained 1000 ms
Long duration maintained 0
Recommended short duration power l 1.25 * Long Duration
Short duration power limit 0
Socket specific CPU Information
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.

Socket 0 CPU Information

Socket specific CPU Information (Read Only)

Choices: 0-255


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
Socket 0 CPU Information
Intel(R) Core(TM) i5-2400 CPU @ 3.10GHz
CPU Signature 206a7
Microcode Patch 14
Max CPU Speed 3100 MHz
Min CPU Speed 1600 MHz
Processor Cores 4
Intel HT Technology Not Supported
Intel VT-x Technology Supported
Intel SMX Technology Supported
L1 Data Cache 32 kB x 4
L1 Code Cache 32 kB x 4
L2 Cache 256 kB x 4
L3 Cache 6144 kB
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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Active Processor Cores
Number of cores to enable in each processor package.
Choices: All, 1, 2, 3.

Limit CPUID Maximum
Disabled for Windows XP.
Choices: Disabled, Enabled.

Execute Disable Bit
XP can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (Windows Server 2003 SP1, Windows XP SP2, SuSE Linux 9.2, RedHat Enterprise 3 Update 3.).
Choices: Disabled, Enabled.

Hardware Prefetcher
To turn on/off the Mid Level Cache (L2) streamer prefetcher.
Choices: Disabled, Enabled.

Adjacent Cache Line Prefetch
To turn on/off the prefetching of adjacent cache lines.
Choices: Disabled, Enabled.

Intel Virtualization Technology
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Choices: Disabled, Enabled.

Local x2APIC
Enable Local x2APIC. Some OSes do not support this.
Choices: Disabled, Enabled.

Power Technology
Enable the power management features.
Choices: Disabled, Energy Efficient, Custom.

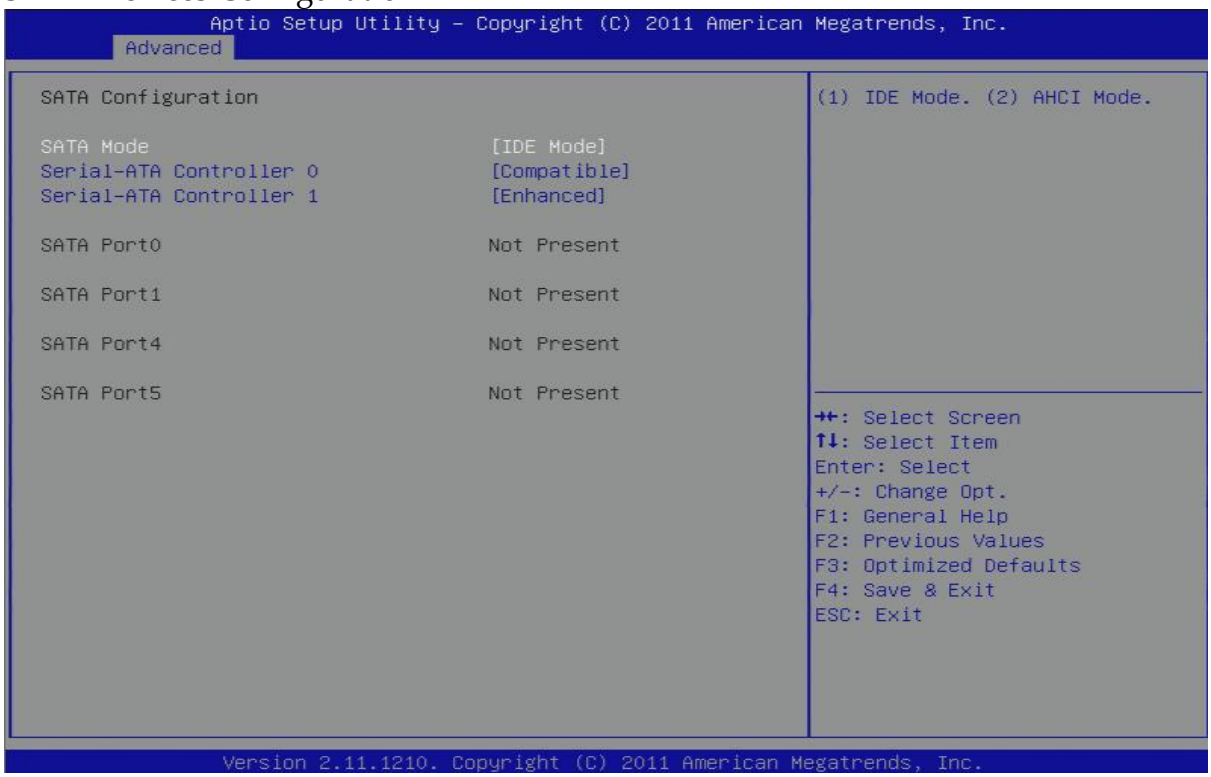
Long duration power limit
Long duration power limit in Watts.
Choices: 0-255.

Long duration maintained
Time window which the long duration power is maintained.
Choices: 0-32000.

Short duration power limit
Short duration power limit in Watts.
Choices: 0-255.

SATA Configuration

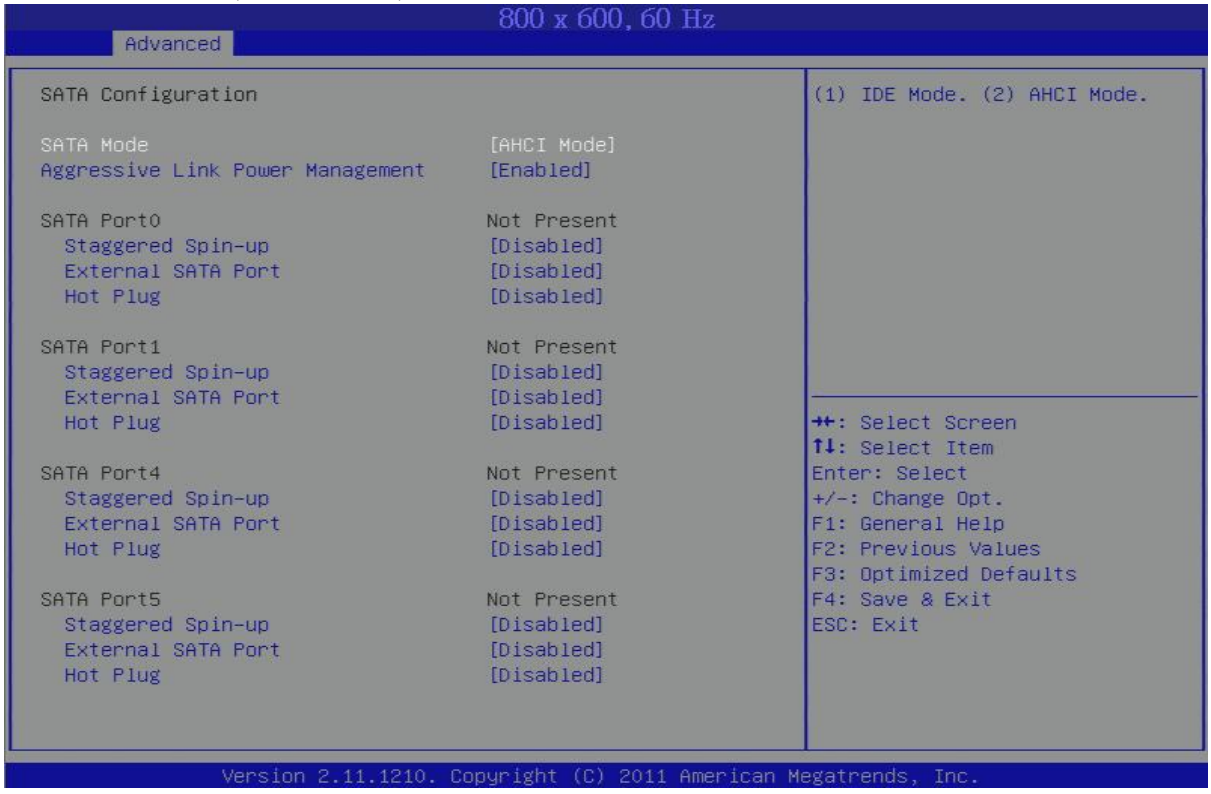
SATA Devices Configuration



SATA Mode

(1) IDE Mode. (2) AHCI Mode.

Choices: Disable, IDE Mode, AHCI Mode.



Aggressive Link Power Management
Aggressive Link Power Management Support. For Cougar Point B0 stepping onwards.
Choices: Disabled, Enabled.

Staggered Spin-up
AHCI Supports Staggered Spin-up.
Choices: Disabled, Enabled.

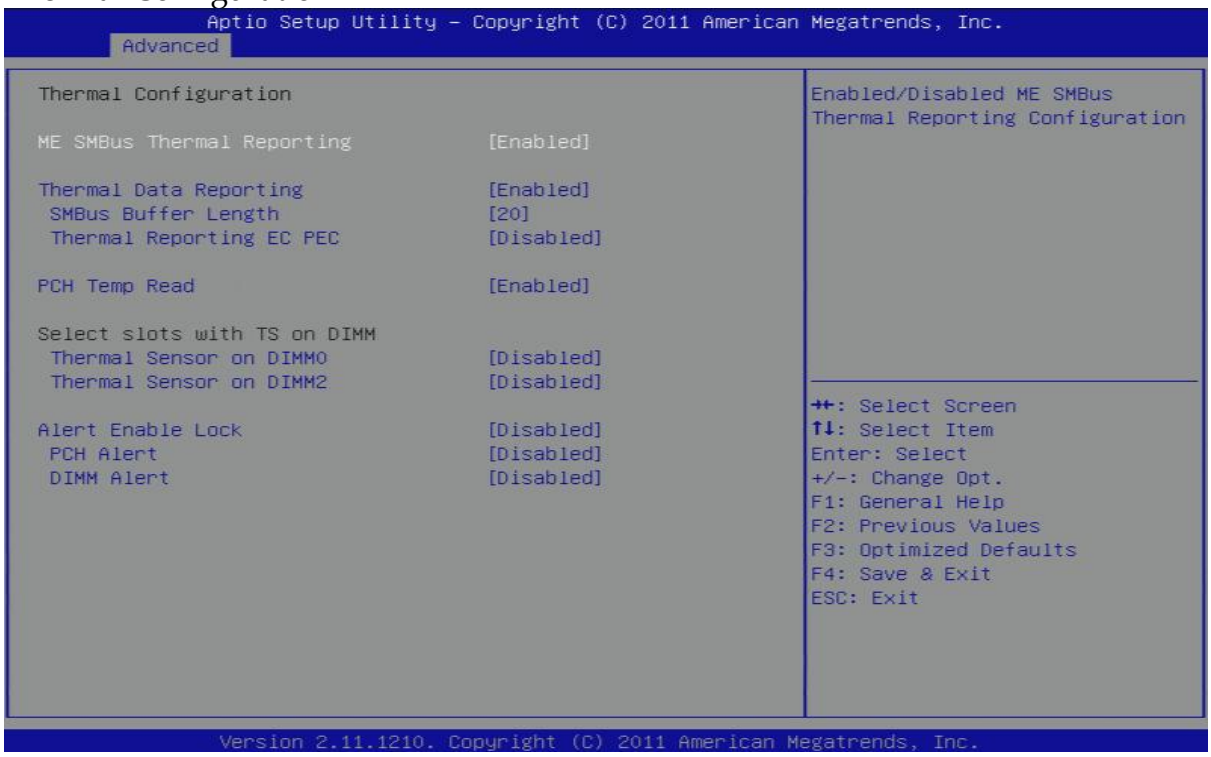
External SATA Port
eSATA Ports Support.
Choices: Disabled, Enabled.

Hot Plug
SATA Ports Hot Plug Support.
Choices: Disabled, Enabled.

Serial-ATA Controller 0
Enabled/Disabled Serial ATA Controller 0.
Choices: Disabled, Enhanced, Compatible.

Serial-ATA Controller 1
Enabled/Disabled Serial ATA Controller 1.
Choices: Disabled, Enhanced.

Thermal Configuration
Thermal Configuration


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
Thermal Configuration
ME SMBus Thermal Reporting [Enabled]
Thermal Data Reporting [Enabled]
SMBus Buffer Length [20]
Thermal Reporting EC PEC [Disabled]
PCH Temp Read [Enabled]
Select slots with TS on DIMM
Thermal Sensor on DIMM0 [Disabled]
Thermal Sensor on DIMM2 [Disabled]
Alert Enable Lock [Disabled]
PCH Alert [Disabled]
DIMM Alert [Disabled]
Enabled/Disabled ME SMBus Thermal Reporting Configuration
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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ME SMBus Thermal Reporting
Enabled/Disabled ME SMBus Thermal Reporting Configuration.
Choices: Disabled, Enabled.

Thermal Data Reporting
Thermal Data Reporting Enable.
Choices: Disabled, Enabled.

SMBus Buffer Length
SMBus Block Read message length for EC.
Choices: 1, 2, 5, 9, 10, 14, 20.

Thermal Reporting EC PEC
Enable Packet Error Checking (PEC) for SMBus Block Read.
Choices: Disabled, Enabled.

PCH Temp Read
PCH Temperature Read Enable.
Choices: Disabled, Enabled.

Thermal Sensor on DIMM0
Thermal Sensor on DIMM0.
Choices: Disabled, Enabled.

Thermal Sensor on DIMM2
Thermal Sensor on DIMM2.
Choices: Disabled, Enabled.

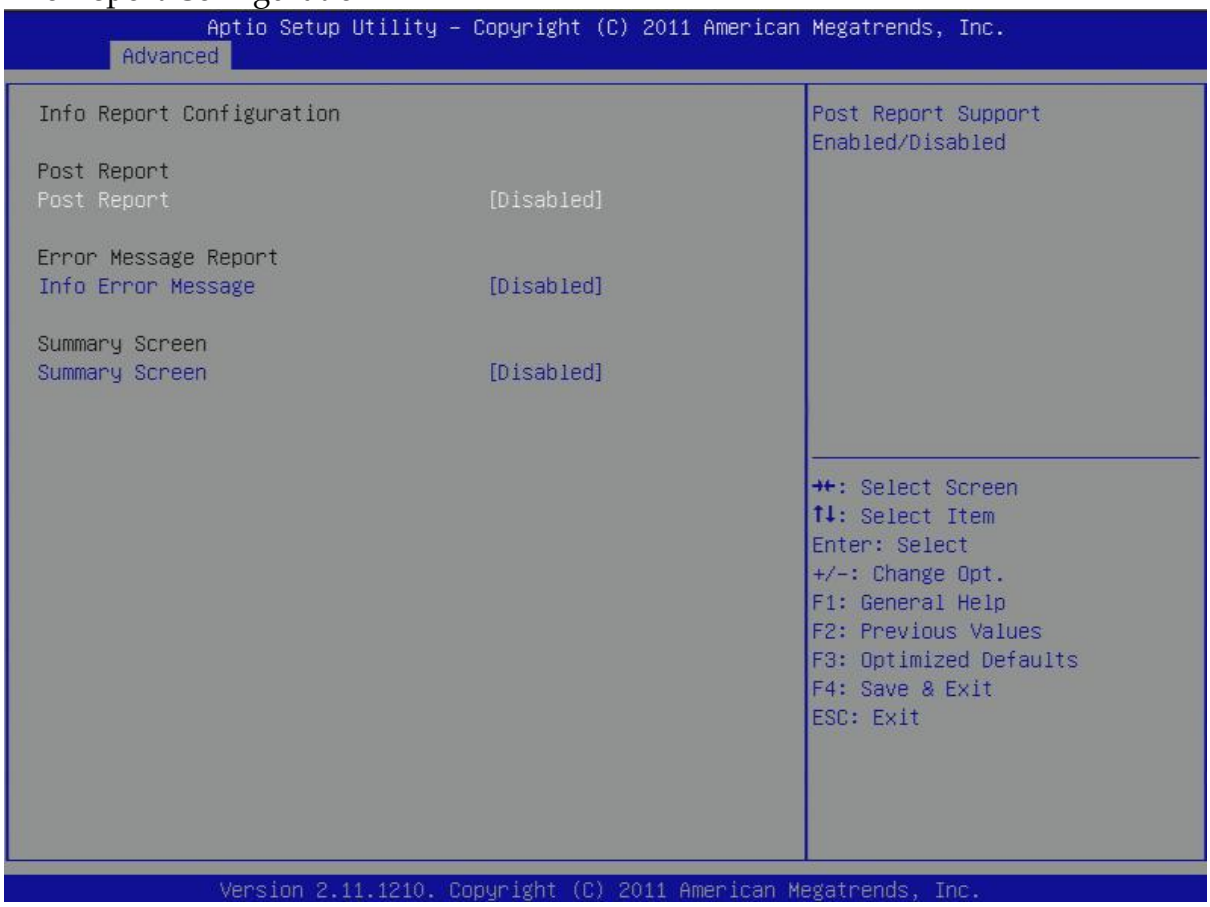
Alert Enable Lock
Lock all Alert Enable settings.
Choices: Disabled, Enabled.

PCH Alert
PCH Alert pin enable.
Choices: Disabled, Enabled.

DIMM Alert
DIMM Alert pin enable
Choices: Disabled, Enabled.

Info Report Configuration

Info Report Configuration



Post Report

Info error Message Support Enabled/Disabled.
Choices: Disabled, Enabled.

Delay Time

Post Report Wait Time: 0~10 Seconds.
Choices: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, Until Press Esc.

Info Error Message

Info Error Message Support Enabled/Disabled.
Choices: Disabled, Enabled.

Summary Screen

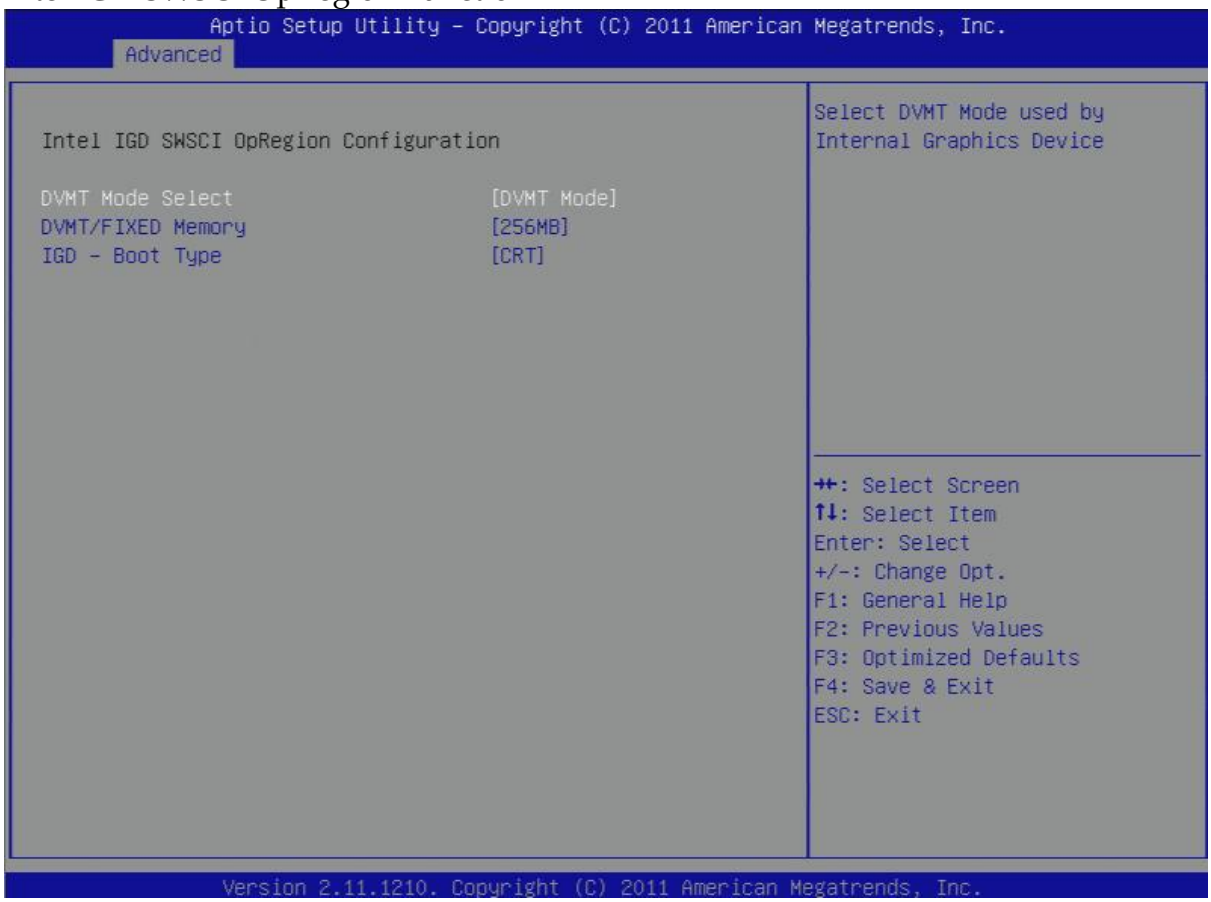
Summary Screen Support Enabled/Disabled..
Choices: Disabled, Enabled.

Delay Time

Post Report Wait Time: 0~10 Seconds.
Choices: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, Until Press Esc.

Intel IGD SWSCI Configuration

Intel IGD SWSCI OpRegion Function


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
Intel IGD SWSCI OpRegion Configuration
DVMT Mode Select [DVMT Mode]
DVMT/FIXED Memory [256MB]
IGD – Boot Type [CRT]
Select DVMT Mode used by Internal Graphics Device
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.

DVMT Mode Select

Select DVMT Mode used by Internal Graphic Device.
Choices: Fixed Mode, DVMT Mode.

DVMT/FIXED Memory

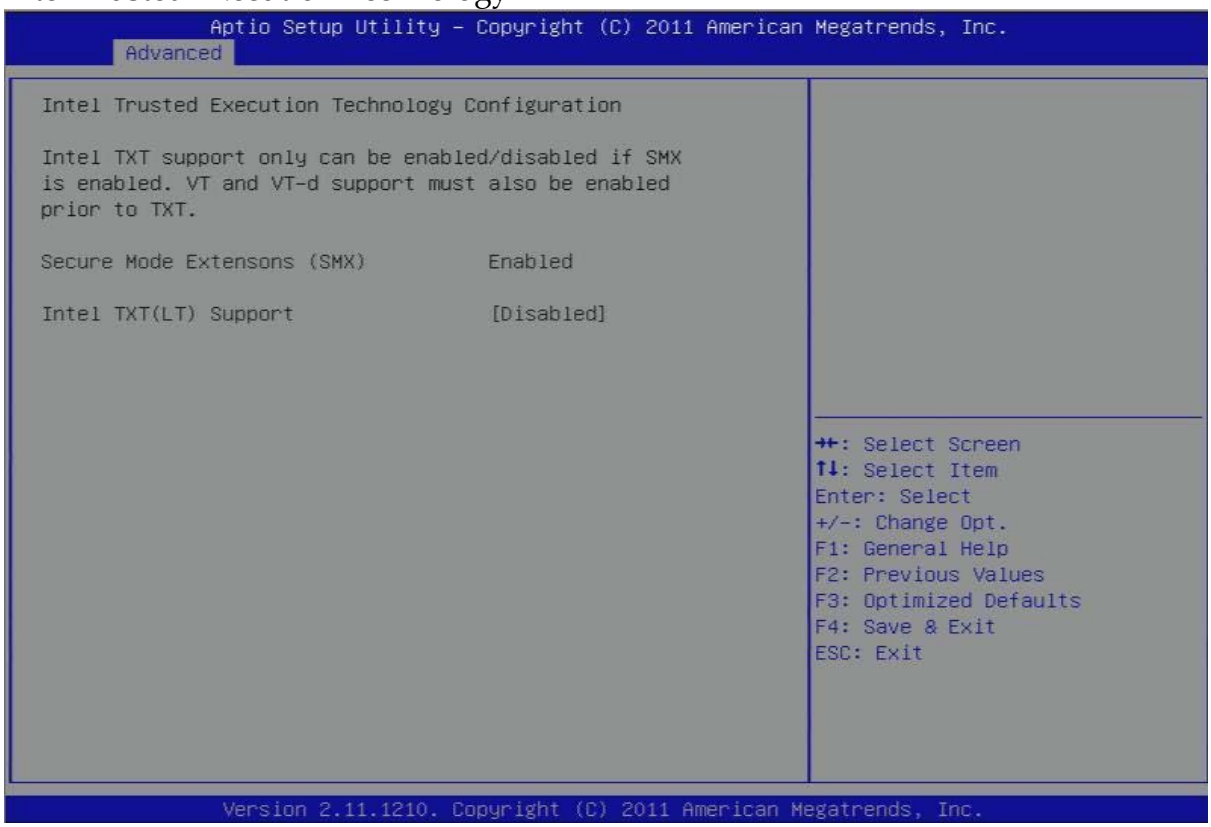
Select DVMT/FIXED Mode Memory size used by Internal Graphic Device.
Choices: 128MB, 256MB, Maximum.

IGD – Boot Type

Select the Video Device which will be activated during POST. This has no effect if external graphics present.
Choices: CRT, DVI, CRT+DVI.

Intel TXT(LT) Configuration

Intel Trusted Execution Technology


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
Intel Trusted Execution Technology Configuration
Intel TXT support only can be enabled/disabled if SMX is enabled. VT and VT-d support must also be enabled prior to TXT.
Secure Mode Extensons (SMX) Enabled
Intel TXT(LT) Support [Disabled]
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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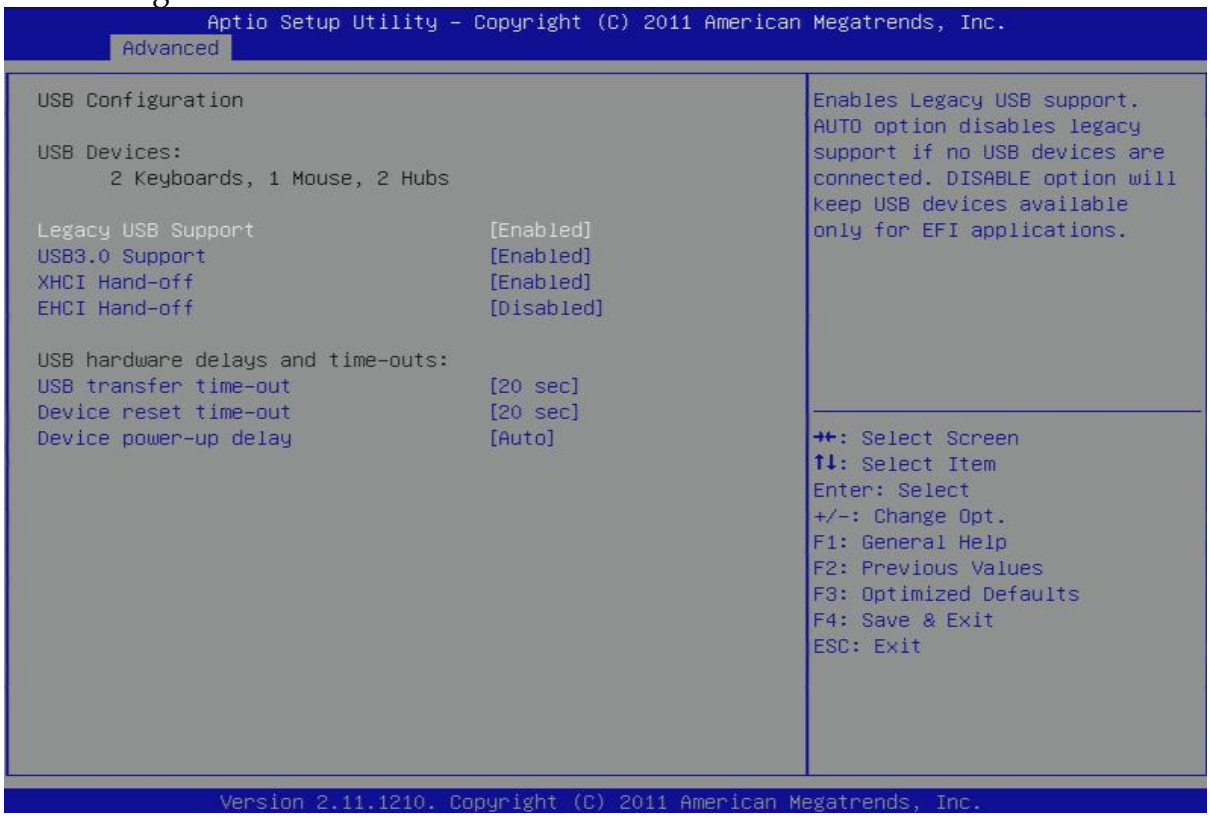
USB Configuration

USB Configuration Parameters


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
USB Configuration
USB Devices:
2 Keyboards, 1 Mouse, 2 Hubs
Legacy USB Support [Enabled]
USB3.0 Support [Enabled]
XHCI Hand-off [Enabled]
EHCI Hand-off [Disabled]
USB hardware delays and time-outs:
USB transfer time-out [20 sec]
Device reset time-out [20 sec]
Device power-up delay [Auto]
Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.

Legacy USB Support
Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
Choices: Enabled, Disabled, Auto.

USB3.0 Support
Enable/Disable USB3.0 (XHCI) Controller support.
Choices: Enabled, Disabled.

XHCI Hand-Off
This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should claim by XHCI driver.
Choices: Disabled, Enabled.

EHCI Hand-Off
This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should claim by EHCI driver.
Choices: Disabled, Enabled.

USB transfer time-out
The Time-out value for Control, Bulk, and Interrupt transfers.
Choices: 1 sec, 5 sec, 10 sec, 20 sec.

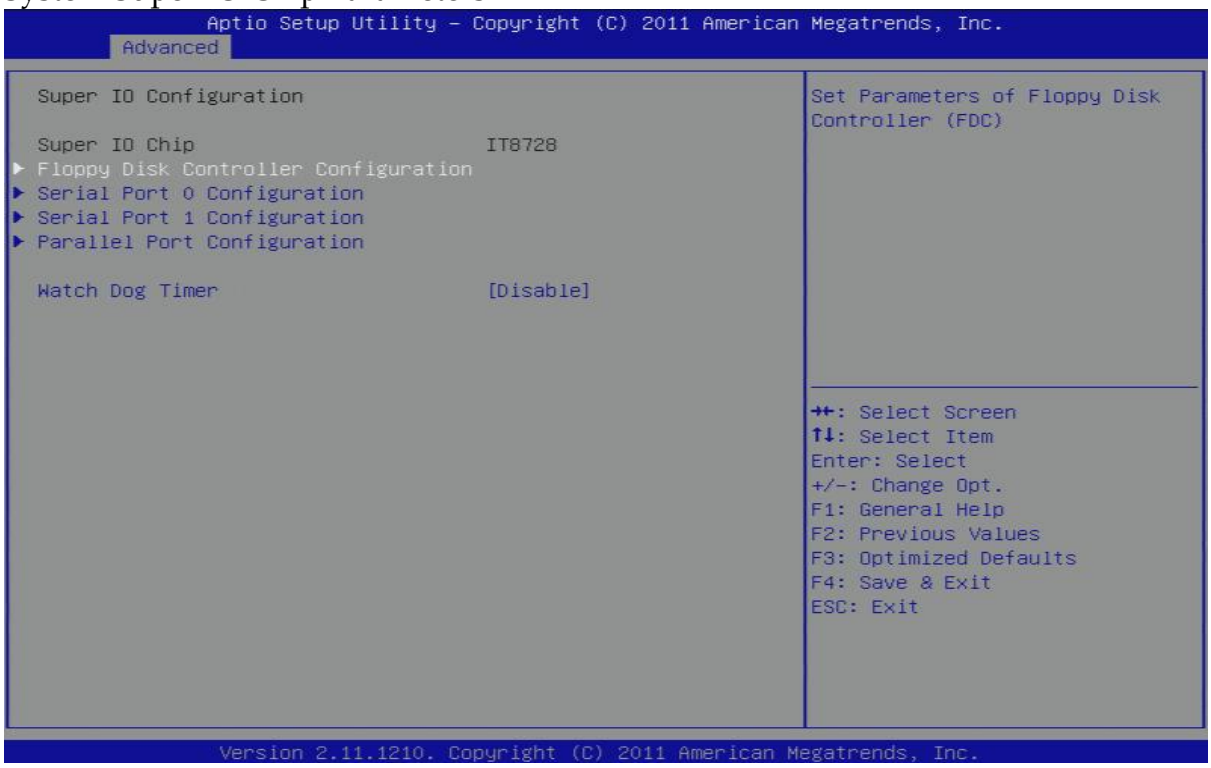
Device Reset time-out
USB mass storage device Start Unit command time-out.
Choices: 10 sec, 20 sec, 30 sec, 40 sec.

Device Power-up delay
Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from Hub descriptor.
Choices: Auto, Manual.

Device Power-up delay in seconds
Delay range is 1..40 seconds, in one second increments.
Choices: 1-40.

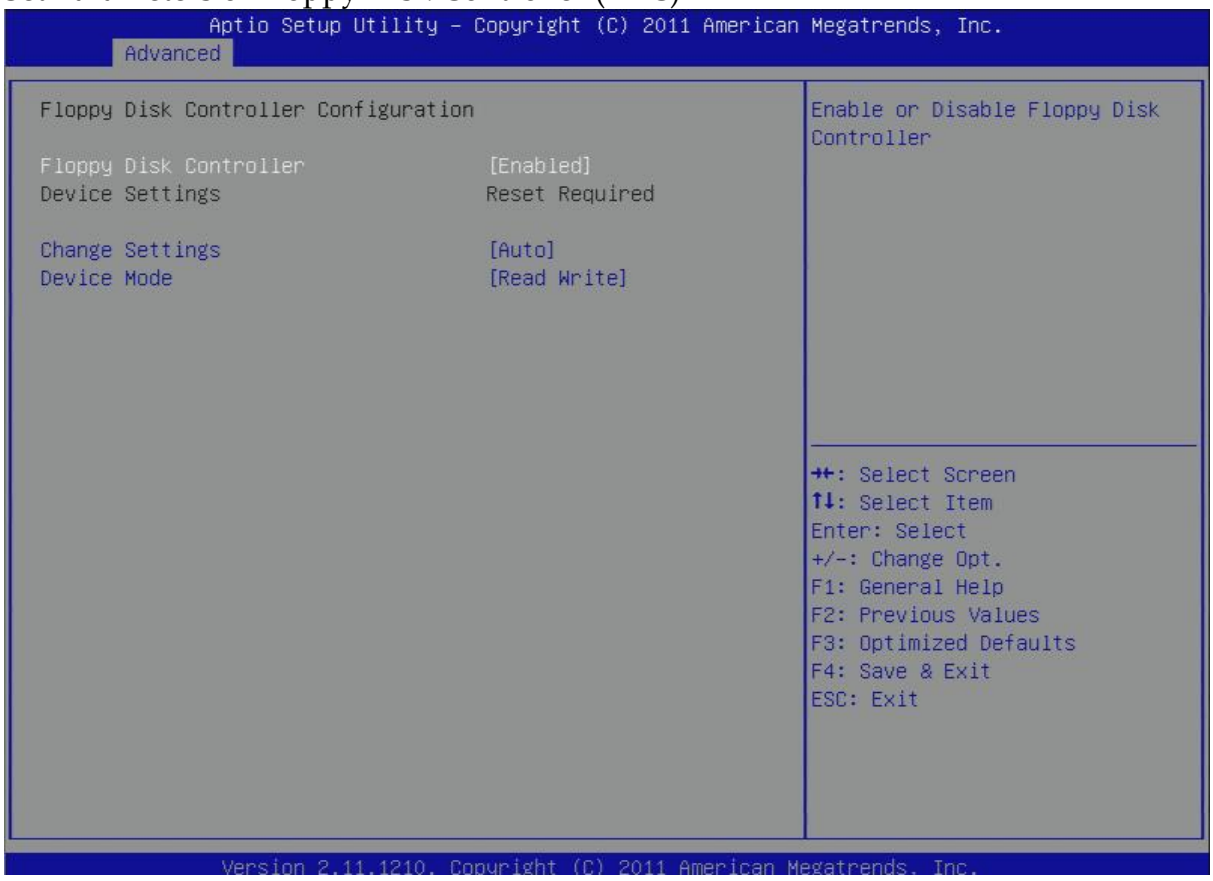
Super IO Configuration

System Super IO Chip Parameters



Floppy Disk Controller Configuration

Set Parameters of Floppy Disk Controller (FDC)

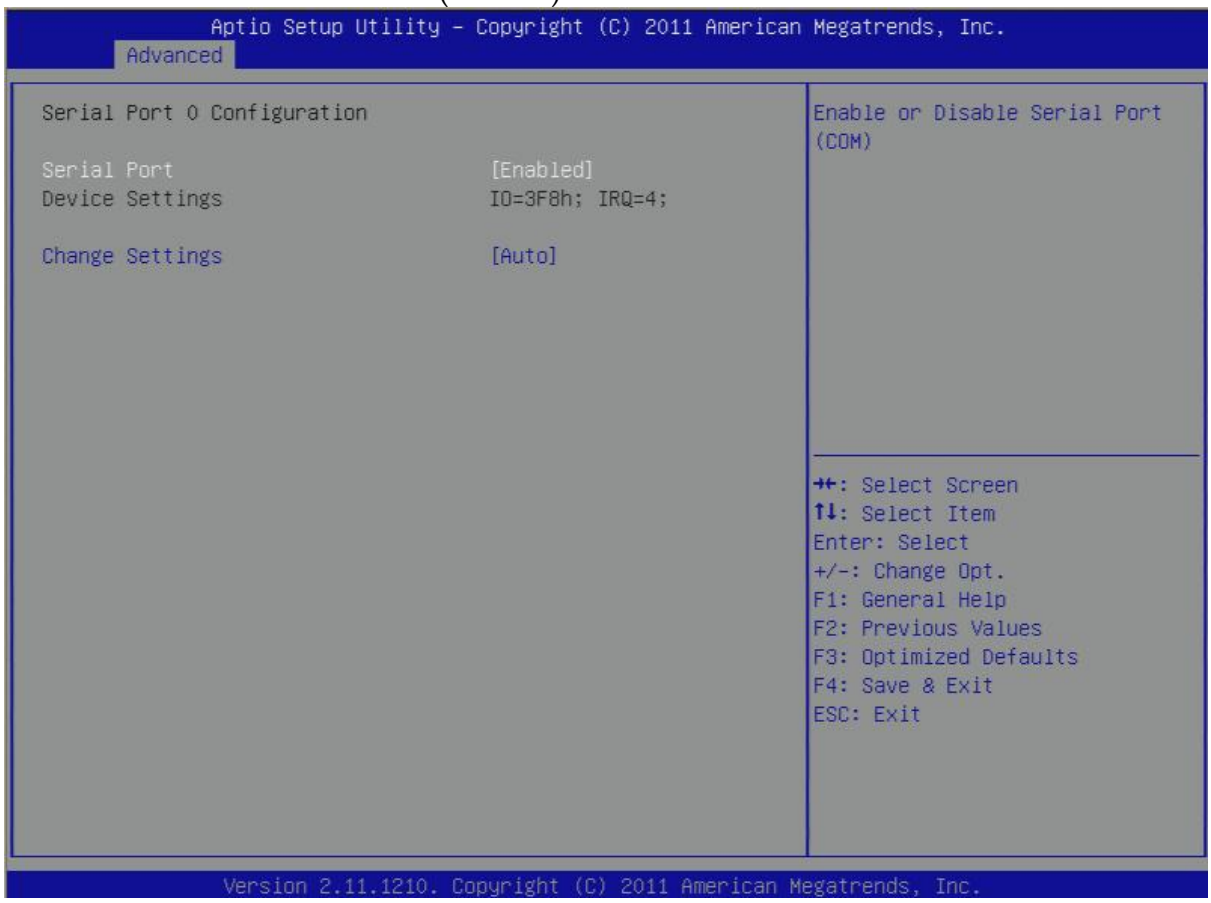


Floppy Disk Controller
Enable or Disable Floppy Disk Controller.
Choices: Disabled, Enabled.

Change Settings
Select an optimal setting for Super IO Device.
Choices: Auto, IO=3F0h; IRQ=6, DMA=2;

Device Mode
Change mode of Floppy Disk Controller. Select 'Read Write' for normal operation. Select 'Write Protect' mode for read only operation.
Choices: Read Write, Write Protect.

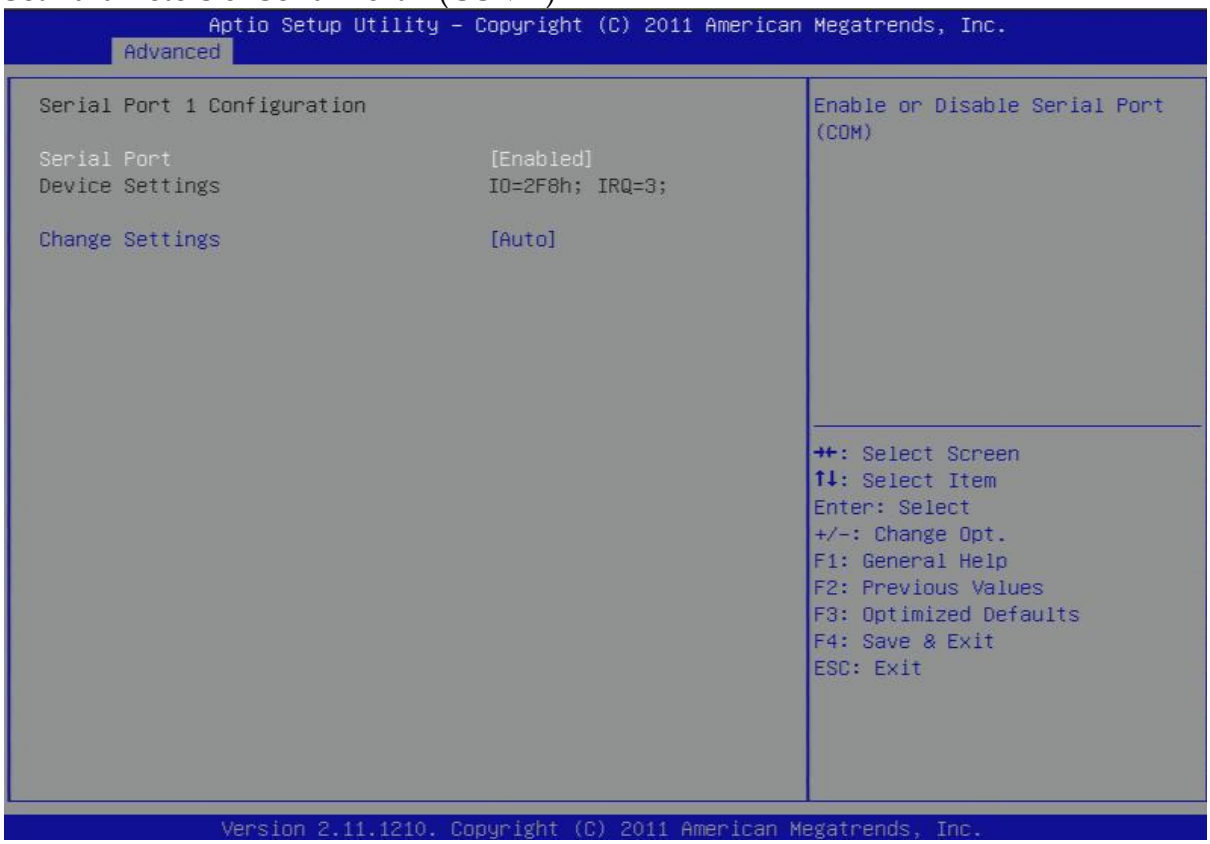
Serial Port 0 Configuration
Set Parameters of Serial Port 0 (COMA)



Serial Port
Enable or Disable Serial Port (COM)
Choices: Disabled, Enabled.

Change Settings
Select an optimal setting for Super IO Device.
Choices: Auto.
IO=3F8h; IRQ=4;
IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

Serial Port 1 Configuration
Set Parameters of Serial Port 1 (COMB)

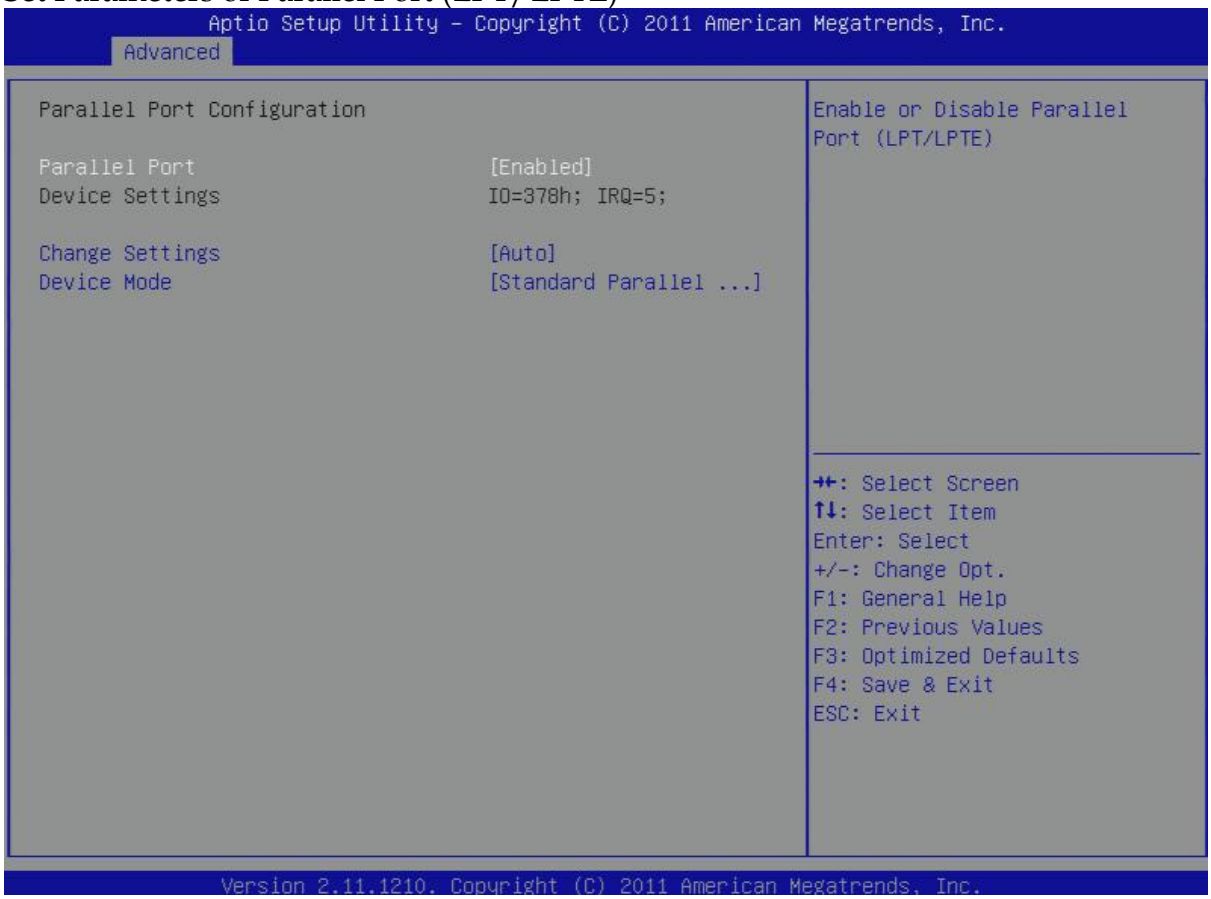


Serial Port
Enable or Disable Serial Port (COM)
Choices: Disabled, Enabled.

Change Settings
Select an optimal setting for Super IO Device.
Choices: Auto.
IO=2F8h; IRQ=3;
IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

Parallel Port Configuration

Set Parameters of Parallel Port (LPT/LPTE)



Parallel Port

Enable or Disable Parallel Port (LPT/LPTE).
Choices: Disabled, Enabled.

Change Settings

Select an optimal setting for Super IO device.
Choices: Auto.
IO=378h; IRQ=5;
IO=378h; IRQ=5, 6, 7, 9, 10, 11, 12;
IO=278h; IRQ=5, 6, 7, 9, 10, 11, 12;
IO=3BCh; IRQ=5, 6, 7, 9, 10, 11, 12;

Device Mode

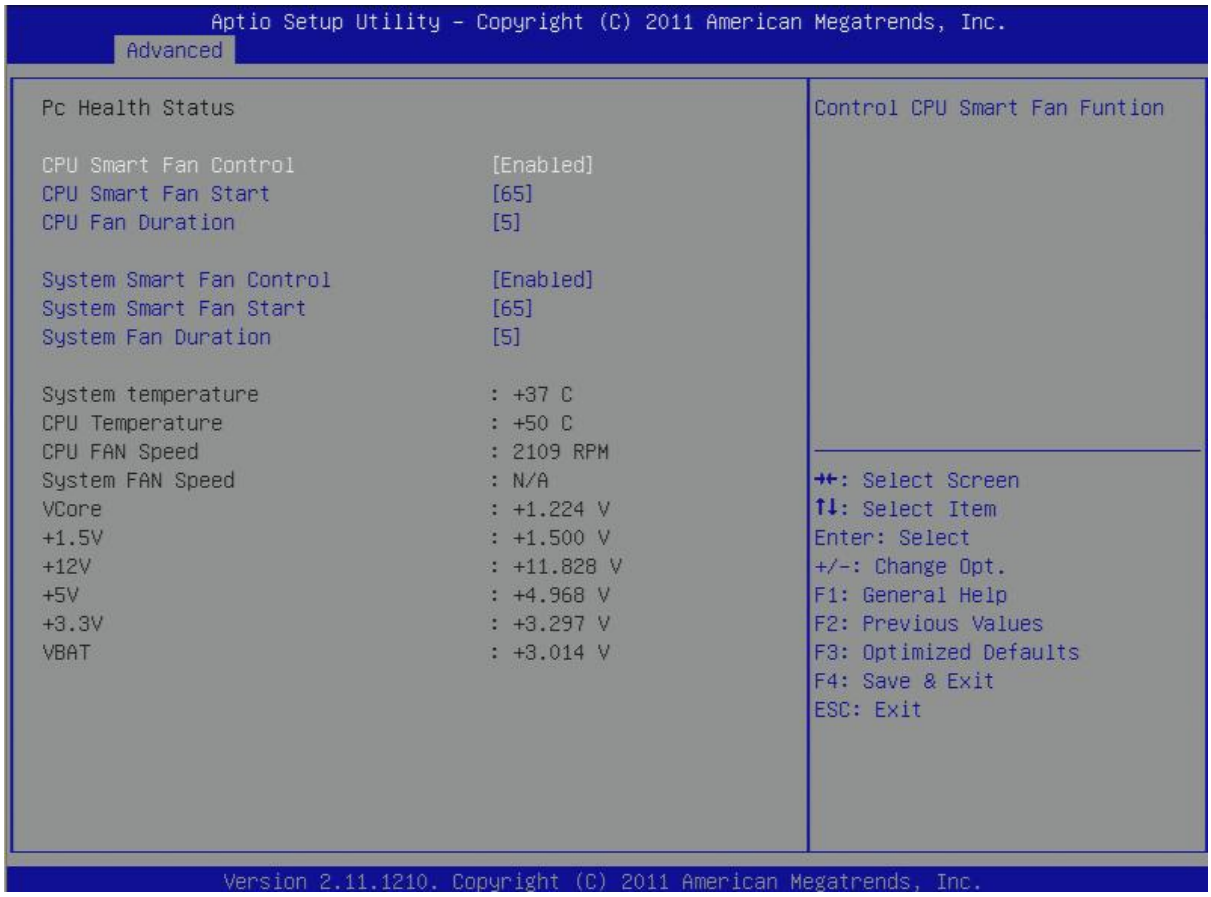
Change the Printer Port Mode.
Choices: Standard Parallel Port Mode, EPP Mode, ECP Mode, EPP Mode & ECP Mode.

Watch Dog Timer

Set watch dog timer value.
Choices: Disabled, 10 Seconds, 20 Seconds, 30 Seconds, 40 Seconds, 50 Seconds, 60 Seconds.

H/W Monitor

Monitor hardware status


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
Pc Health Status
CPU Smart Fan Control [Enabled]
CPU Smart Fan Start [65]
CPU Fan Duration [5]
System Smart Fan Control [Enabled]
System Smart Fan Start [65]
System Fan Duration [5]
System temperature : +37 C
CPU Temperature : +50 C
CPU FAN Speed : 2109 RPM
System FAN Speed : N/A
VCore : +1.224 V
+1.5V : +1.500 V
+12V : +11.828 V
+5V : +4.968 V
+3.3V : +3.297 V
VBAT : +3.014 V
Control CPU Smart Fan Funtion
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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CPU Smart Fan Control

Control CPU Smart Fan Function.
Choices: Disabled, Enabled.

CPU Smart Fan Start

Fan start Temperature.
Choices: 25, 30, 35, 40, 45, 50, 55, 60, 65, 70.

CPU Fan Duration

The CPU Fan Duration. When CPU Temperature above 'CPU Smart Fan Start' + This item value. The CPU Fan will run full speed. When CPU Temperature above 'CPU Fan Start' – This item value. The CPU Fan will run minimum speed.
Choices: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

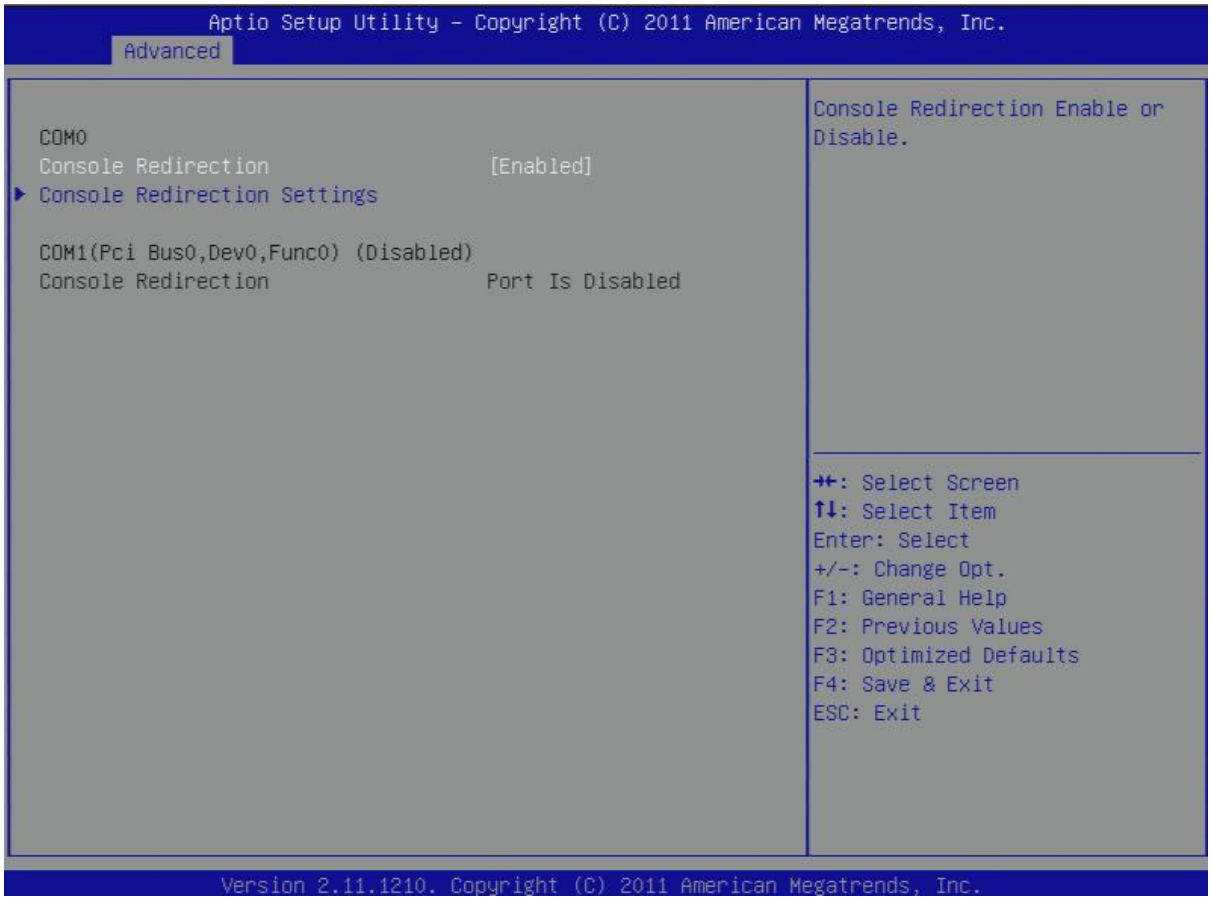
System Smart Fan Control

Control System Smart Fan Function.
Choices: Disabled, Enabled.

System Smart Fan Start
Fan start Temperature.
Choices: 25, 30, 35, 40, 45, 50, 55, 60, 65, 70.

System Fan Duration
The System Fan Duration. When System Temperature above 'System Smart Fan Start' + This item value. The System Fan will run full speed. When System Temperature above 'System Fan Start' – This item value. The System Fan will run minimum speed.
Choices: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

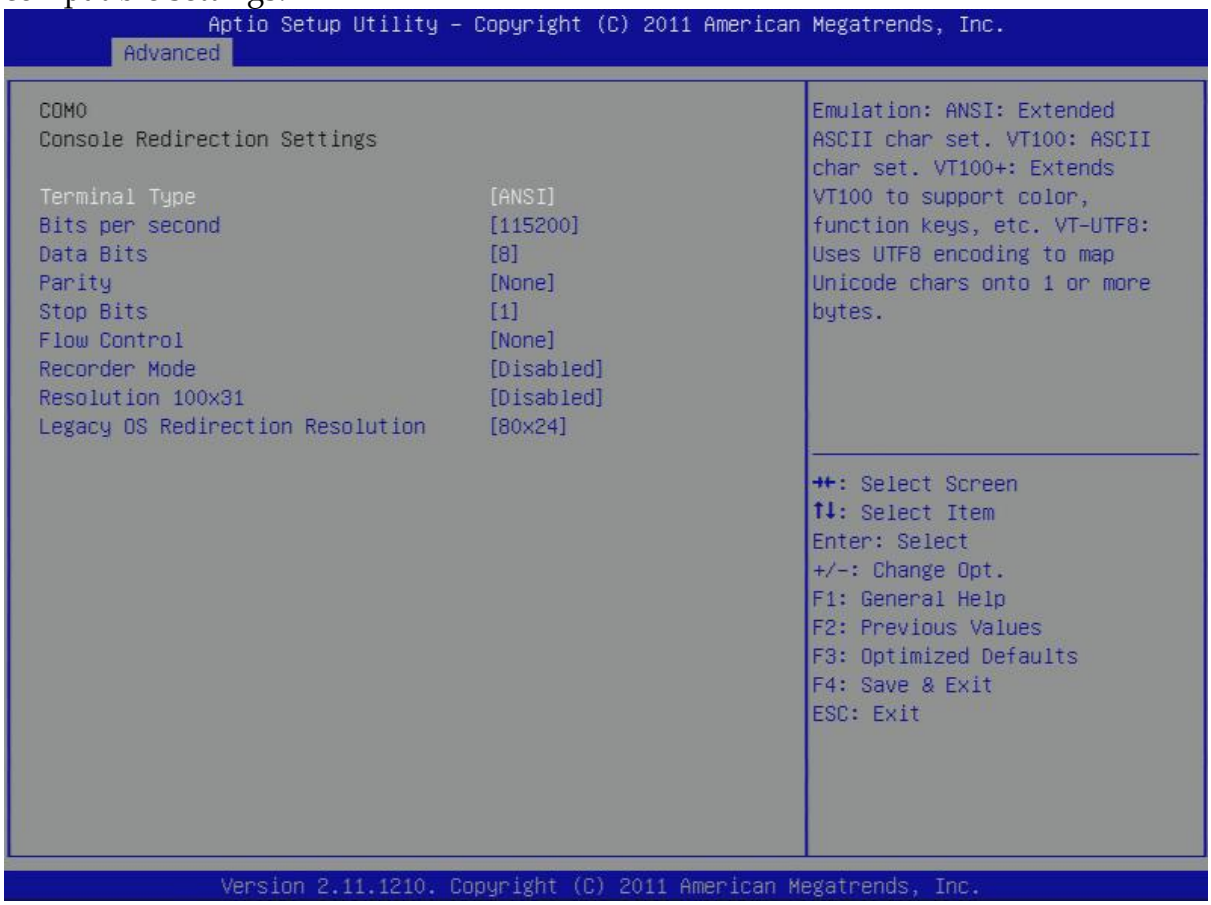
Serial Port Console Redirection
Serial Port Console Redirection



Console Redirection
Console Redirection Enable or Disable.
Choices: Disabled, Enabled.

Console Redirection Settings

The Settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Advanced
COM0
Console Redirection Settings
Terminal Type [ANSI]
Bits per second [115200]
Data Bits [8]
Parity [None]
Stop Bits [1]
Flow Control [None]
Recorder Mode [Disabled]
Resolution 100x31 [Disabled]
Legacy OS Redirection Resolution [80x24]
Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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Terminal Type

Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Choices: VT100, VT100+, VT-UTF8, ANSI.

Bits per second

Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Choices: 9600, 19200, 38400, 57600, 115200.

Data Bits

Data Bits
Choices: 7, 8.

Parity
A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: parity bit is always 0. Mark and Space Parity do not allow for error detection.
Choices: None, Even, Odd, Mark, Space.

Stop Bits
Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
Choices: 1, 2.

Flow Control
Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
Choices: None, Hardware RTS/CTS.

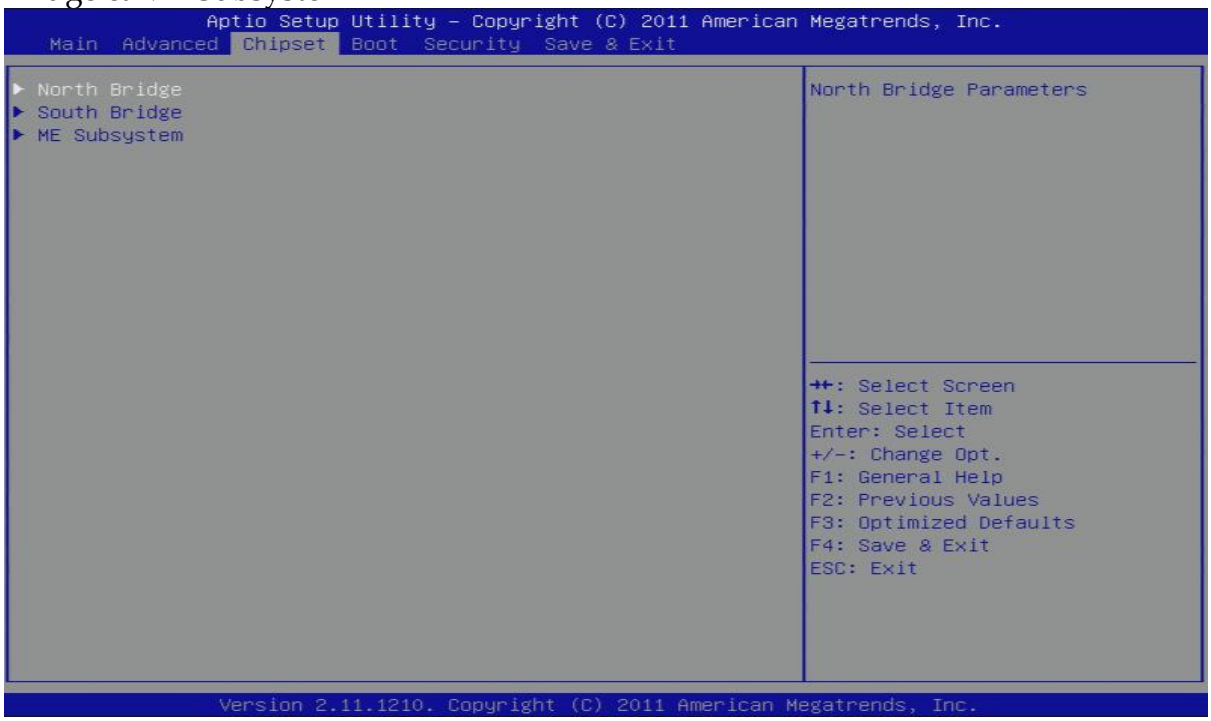
Recorder Mode
With this mode enabled only test will be sent. This is to capture Terminal data.
Choices: Disabled, Enabled.

Resolution 100X31
Enables or disables extended terminal resolution.
Choices: Disabled, Enabled.

Legacy OS Redirection Resolution
On Legacy OS, the number of Rows and Columns supported redirection.
Choices: 80x24, 80x25.

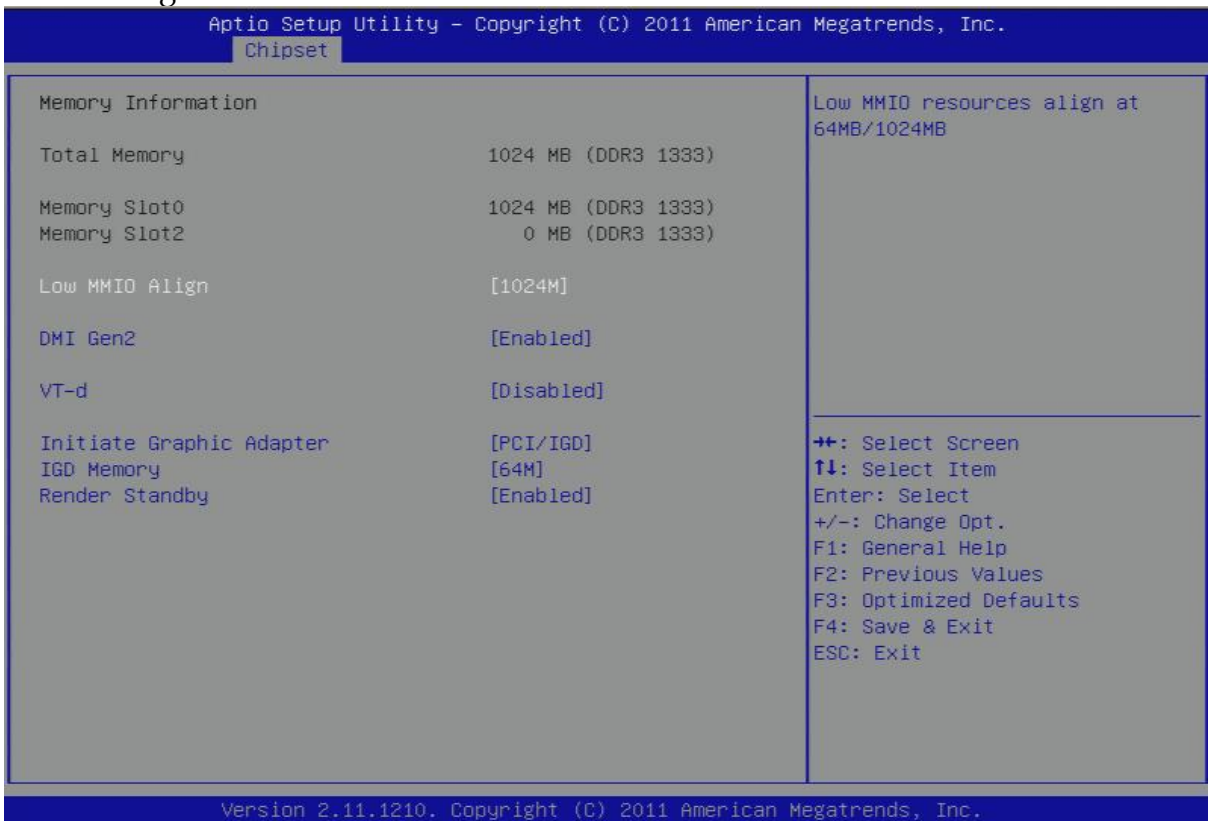
4.4 Boot

This menu controls the advanced features of the onboard North Bridge and South Bridge & ME Subsystem



North Bridge

North Bridge Parameters



Low MMIO Align
Low MMIO resources align at 64MB/1024MB.
Choices: 64M, 1024M.

DMI Gen2
DMI Gen2 Enabled/Disabled.
Choices: Disabled, Enabled.

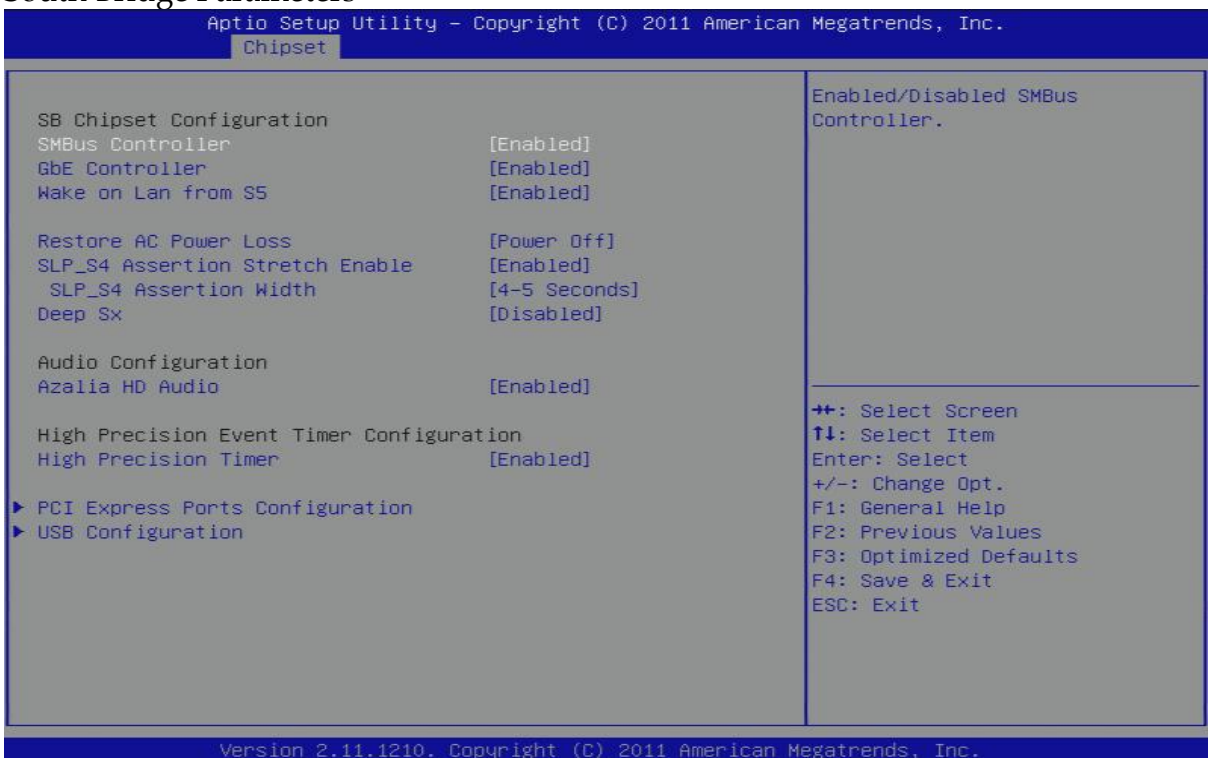
VT-d
VT-d Enable/Disable.
Choices: Disabled, Enabled.

Initiate Graphic Adapter
Select which graphics controller to use as the primary boot device.
Choices: IGD, PCI/IGD.

IGD Memory
IGD Share Memory Size.
Choices: Disable, 32M, 64M, 96M, 128M, 160M, 192M, 224M, 256M, 288M, 320M, 352M, 384M, 416M,448M, 480M, 512M.

Render Standby
Enable/Disable Render Standby by Internal Graphics Device.
Choices: Disabled, Enabled.

South Bridge
South Bridge Parameters



SMBus Controller
Enabled/Disabled SMBus Controller.
Choices: Disabled, Enabled.

GbE Controller
Enabled/Disabled GbE Controller.
Choices: Disabled, Enabled.

Wake on Lan from S5
Enabled/Disabled GbE control PME in S5.
Choices: Disabled, Enabled.

Restore AC Power Loss
Specify what state to go to when power is re-applied after a power failure (G3 State).
Choices: Power Off, Power On, Last State.

SLP_S4 Assertion Stretch Enable
Enabled/Disabled SLP_S4# Assertion Stretch.
Choices: Disabled, Enabled.

SLP_S4 Assertion Stretch Width
Select a minimum assertion width of the SLP_S4# Assertion signal.
Choices: 1-2 Seconds, 2-3 Seconds, 3-4 Seconds, 4-5 Seconds.

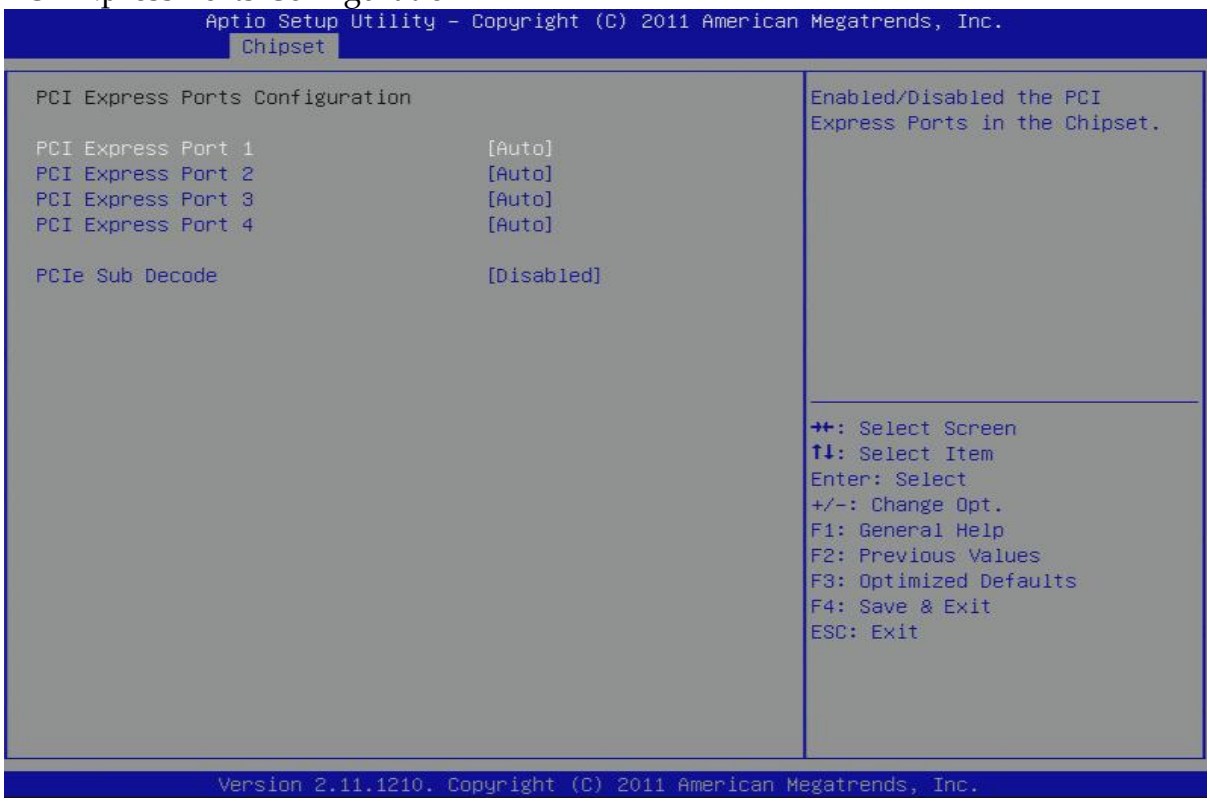
Deep Sx
Deep Sx configuration. Note: Mobile platforms support Deep S4/S5 in DC only and Desktop platforms support Deep S4/S5 in AC only.
Choices: Disabled, Enabled in S5 (Battery), Enabled in S5, Enabled in S4 and S5 (Battery), Enabled in S4 and S5.

Azalia HD Audio
Enabled/Disabled Azalia HD Audio.
Choices: Disabled, Enabled.

High Precision Timer
Enabled/Disabled the High Precision Event Timer.
Choices: Disabled, Enabled.

PCI Express Ports Configuration

PCI Express Ports Configuration


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Chipset
PCI Express Ports Configuration
PCI Express Port 1 [Auto]
PCI Express Port 2 [Auto]
PCI Express Port 3 [Auto]
PCI Express Port 4 [Auto]
PCIe Sub Decode [Disabled]
Enabled/Disabled the PCI Express Ports in the Chipset.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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PCI Express Port 1/2/3/4

Enabled/Disabled the PCI Express Ports in the Chipset.

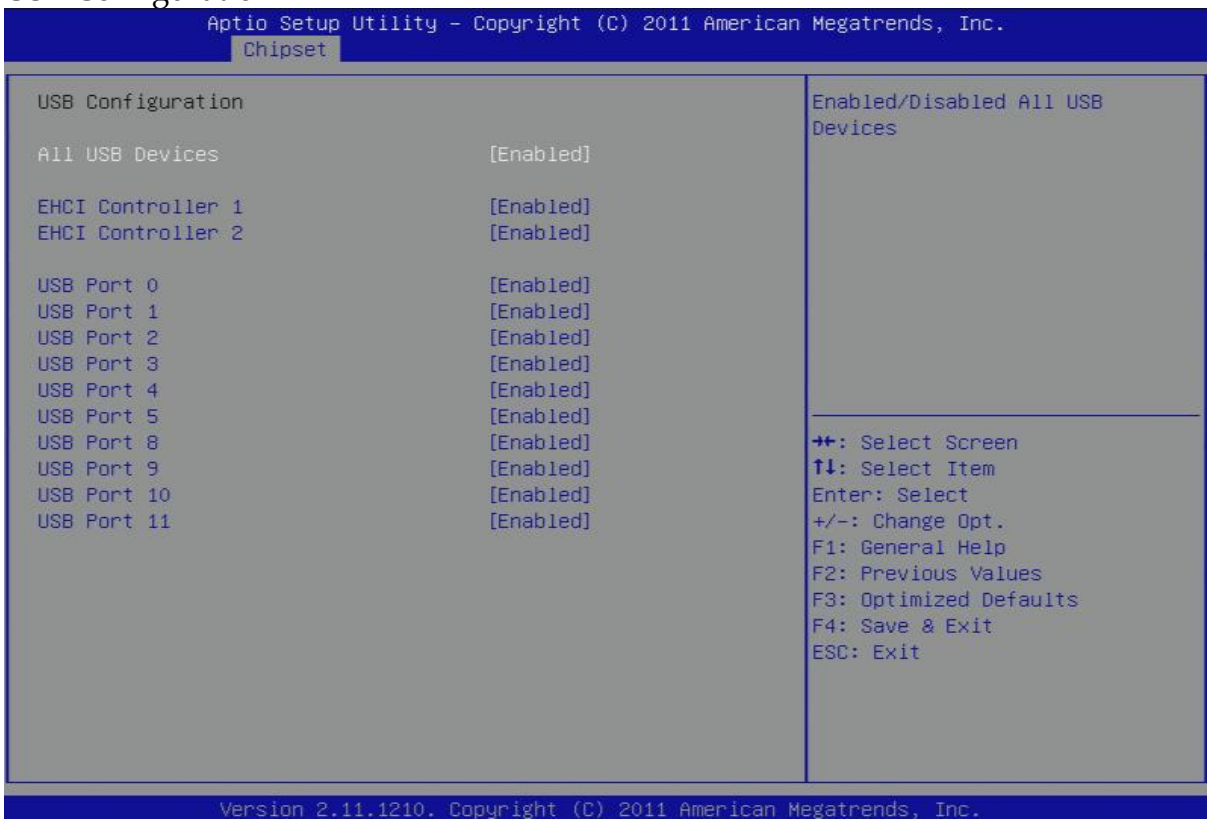
Choices: Disabled, Enabled, Auto.

PCIe Sub Decode

Enabled/Disabled PCIe Sub Decode Port. (This option is available when Subtractive Decode Agent Enable. (PCHTrap9 [14] = '1b')
Choices: Disabled, Enabled.

USB Configuration

USB Configuration



All USB Devices

Enabled/Disabled All USB Devices.
Choices: Disabled, Enabled.

EHCI Controller 1/2

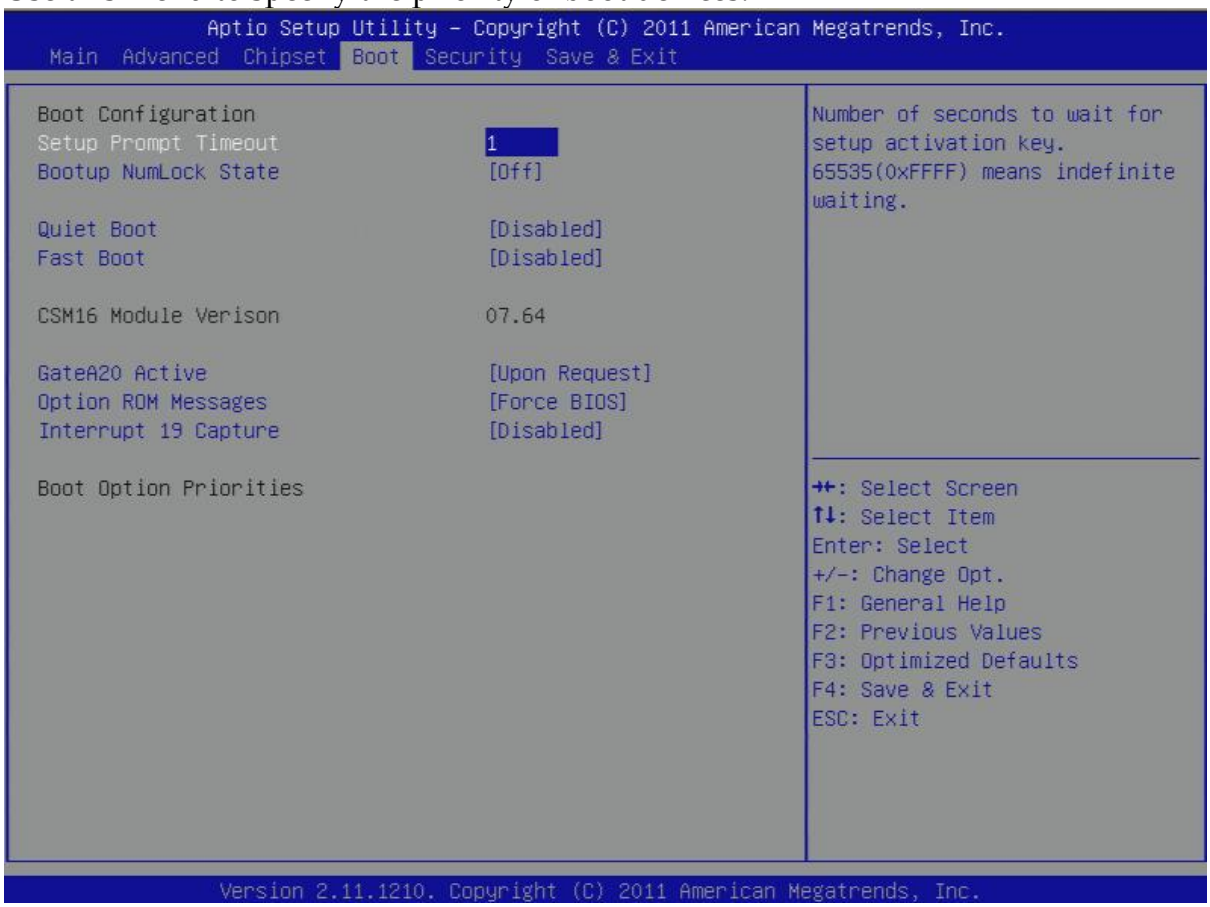
Enabled/Disabled USB2.0 (EHCI) Support.
Choices: Disabled, Enabled.

USB Port 0-11

Enabled/Disabled USB Port 0-11.
Choices: Disabled, Enabled.

4.5 Security

Use this menu to specify the priority of boot devices.



Setup Prompt Timeout

Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Choices: 1-65535.

Bootup Num-Lock State

Select the keyboard Numlock state.
Setting to [On] will turn on the Num Lock key when the system is powered on.
Setting to [Off] will allow users to use the arrow keys on the numeric keypad.
Choices: On, Off.

Quiet Boot

Enables or disables Quiet Boot option.
This BIOS feature determines if the BIOS should hide the normal POST messages with the motherboard or system manufacturer's full-screen logo. When it is enabled, the BIOS will display the full-screen logo during the boot-up sequence, hiding normal POST messages.

When it is disabled, the BIOS will display the normal POST messages, instead of the full-screen logo.

Please note that enabling this BIOS feature often adds 2-3 seconds of delay to the booting sequence. This delay ensures that the logo is displayed for a sufficient amount of time. Therefore, it is recommended that you disabled this BIOS feature for a faster boot-up time.
Choices: Disabled, Enabled.

Fast Boot
Enables or Disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
Choices: Disabled, Enabled.

GateA20 Active
UPON REQUEST – GA20 can be disabled using BIOS services. ALWAYS – do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.
Choices: Upon Request, Always.

Option ROM Messages
Set Display mode for Option ROM.
This item is used to determine the display mode when an optional ROM is initialized during POST. When set to [Force BIOS], the display mode used by AMI BIOS is used. Select [Keep Current] if you want to use the display mode of optional ROM.
Choices: Force BIOS, Keep Current.

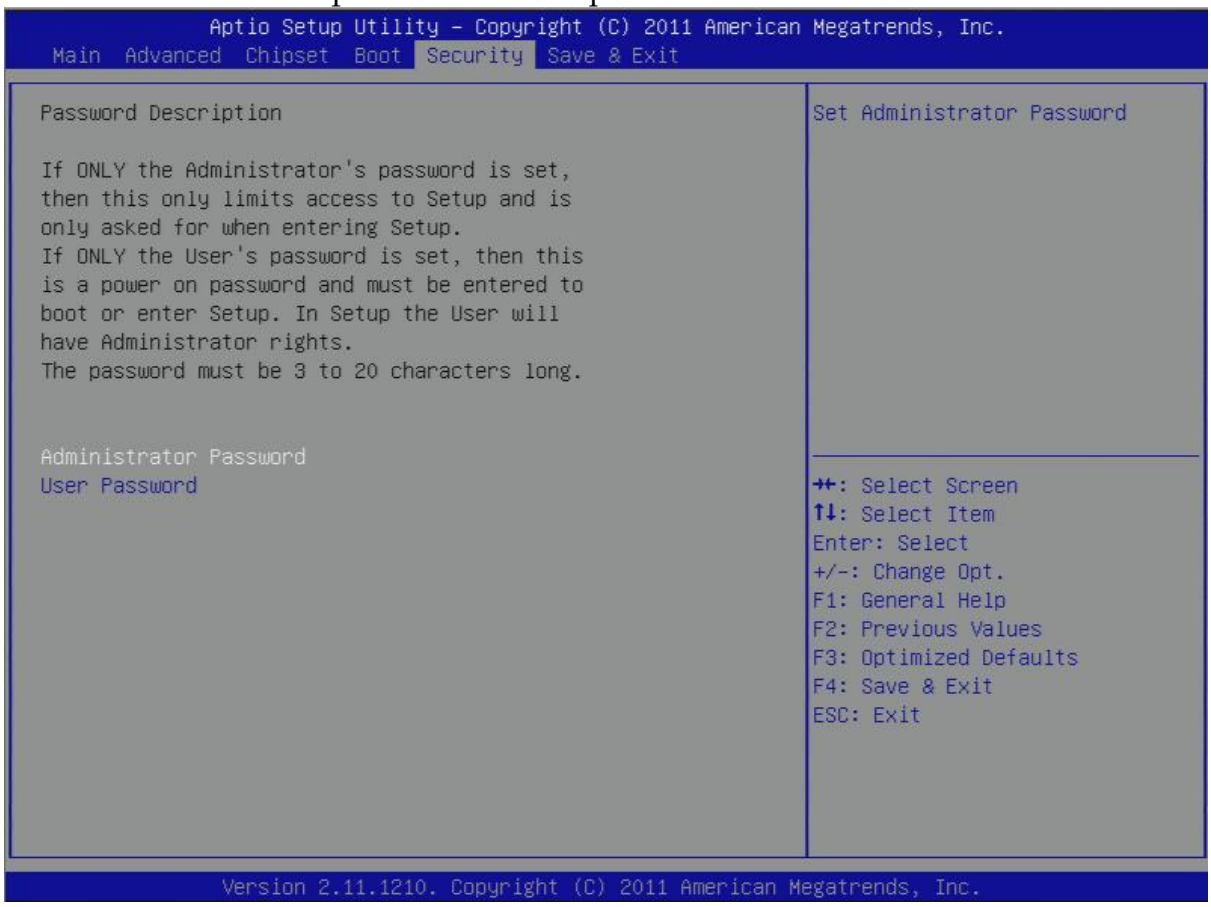
Interrupt 19 Capture
Enabled: Allows Option ROMs to trap Int 19.
Interrupt 19 is the software interrupt that handles the boot disk function. When Enabled, this BIOS feature allows the ROM BIOS of these host adaptors to "capture" Interrupt 19 during the boot process so that drives attached to these adaptors can function as bootable disks. In addition, it allows you to gain access to the host adaptor's ROM setup utility, if one is available.

When Disabled, the ROM BIOS of these host adaptors will not be able to "capture" Interrupt 19. Therefore, you will not be able to boot operating systems from any bootable disks attached to these host adaptors. Nor will you be able to gain access to their ROM setup utilities.
Choices: Disabled, Enabled.

Boot Option #1
Sets the system boot order.
Choices: Built-in EFI Shell, other bootable devices, Disabled.

4.6 Security

Use this menu to set supervisor and user passwords


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Main Advanced Chipset Boot Security Save & Exit
Password Description
If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup.
If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights.
The password must be 3 to 20 characters long.
Administrator Password
User Password
Set Administrator Password
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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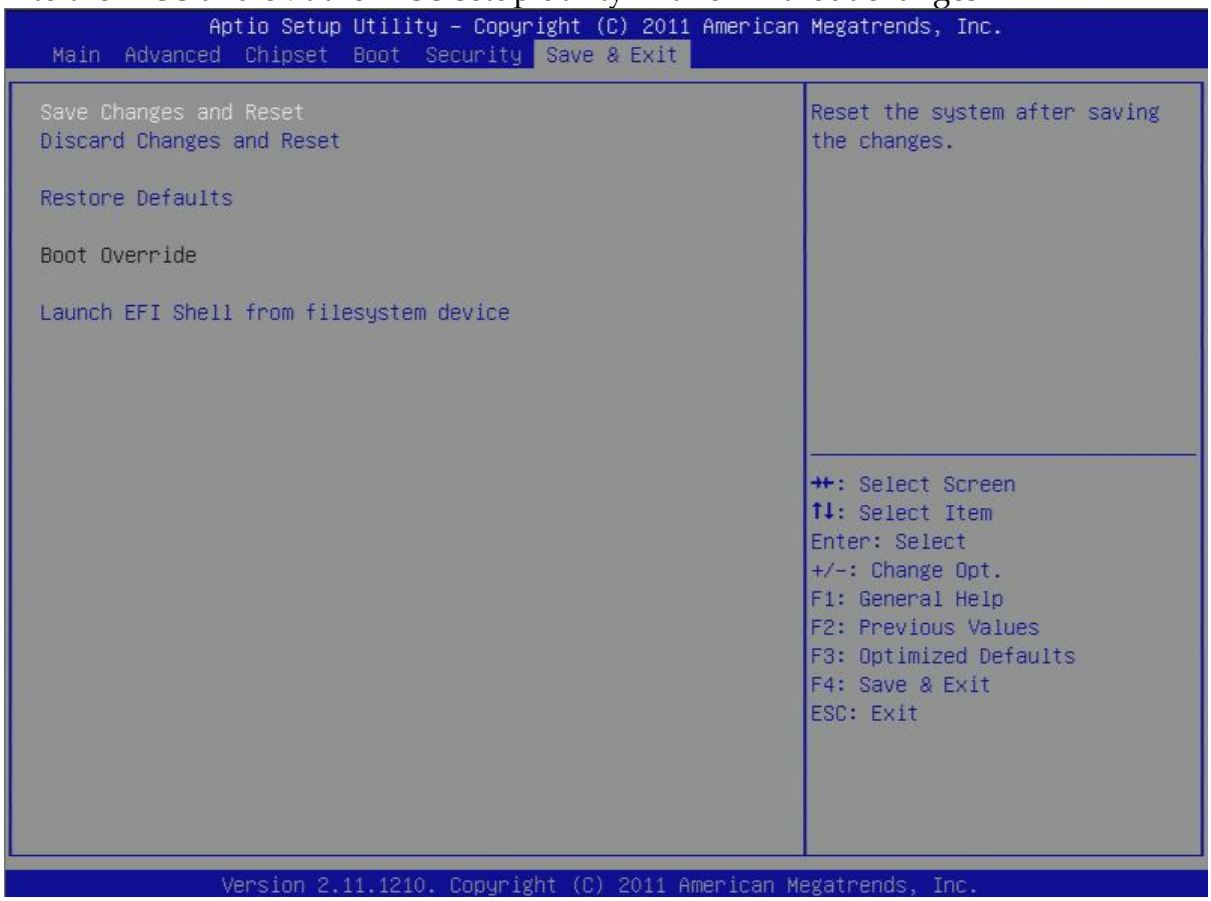
Administrator Password
Set Setup Administrator Password.

User Password
Set User Password.
BIOS setup menu. If you want to know the shell command, you can visit the Intel official hyperlink as below.

http://software.intel.com/en-us/articles/uefi-shell/#Internal_EFI_Shell_Commands

4.7 Save & Exit

This menu allows you to load the BIOS default values or factory default settings into the BIOS and exit the BIOS setup utility with or without changes


Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
Main Advanced Chipset Boot Security Save & Exit
Save Changes and Reset
Discard Changes and Reset
Restore Defaults
Boot Override
Launch EFI Shell from filesystem device
Reset the system after saving the changes.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.

Save Changes and Reset
Reset the system after saving the changes.
Pressing <Enter> on this item asks for confirmation: Save configuration and reset.

Discard Changes and Exit
Reset system setup without saving any changes.

Restore Defaults
Restore/Load Default values for all the setup options.
Launch EFI Shell from filesystem device
To enter the Built-in EFI shell for further modification such as upgrade BIOS.

Built-in EFI Shell
Boot into the initial shell environment, it can debug and dump the PCI Resource or jump to next bootable device. If it doesn't have boot device, it will return to BIOS setup menu. If you want to know the shell command, you can visit the Intel official hyperlink as below.

http://software.intel.com/en-us/articles/uefi-shell/#Internal_EFI_Shell_Commands

Chapter 5
Troubleshooting

This chapter provides a few useful tips to quickly get ROBO-8780VG2A running with success. As basic hardware installation has been addressed in Chapter 2, this chapter will primarily focus on system integration issues, in terms of BIOS setting, and OS diagnostics.

5.1 Hardware Quick Installation

ATX Power Setting

Unlike other Single board computer, ROBO-8780VG2A supports ATX and ATX emulation AT Mode (It must adjust JP4 & JP7 to switch ATX emulation AT Mode). However, there are only two connectors that must be connected—J10 (4 pins CPU +12V main power connector) & 24 pins ATX Power Connector.

Serial ATA Hard Disk Setting for IDE/AHCI

Unlike IDE bus, each Serial ATA channel can only connect to one SATA hard disk at a time; there are total four connectors, J19 & J20, J22, J23 Four ports on-board (those 4 Masters in Non-AHCI mode) support 3Gb, because SATA hard disk doesn't require setting up Master and Slave, which can reduce mistake of hardware installation. All you need to operate IDE and AHCI application for system please follow up setting guide in BIOS programming (Table 5-1); Furthermore, you can consult chapter 4.3
Advanced "SATA Configuration" part of the" SATA Mode".

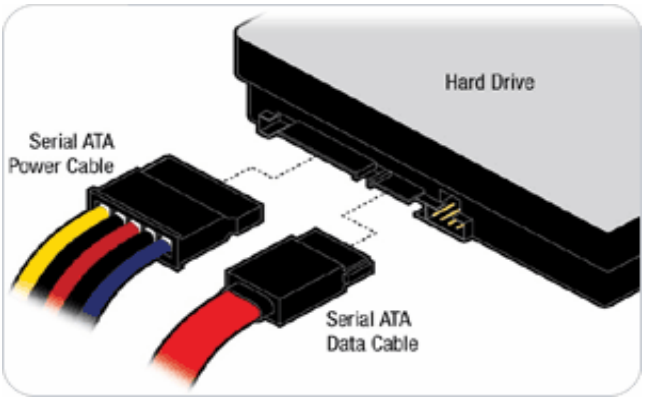


Table. 5-1 SATA Mode setting guide

System BIOS Main Menu
- Advanced
  - SATA Configuration …….…… [Press enter]
    - SATA Mode…… [IDE Mode/AHCI Mode]

5.2 BIOS Setting

It is assumed that users have correctly adopted modules and connected all the devices cables required before turning on ATX power. 240-pin DDR3 Memory, keyboard, mouse, SATA hard disk, VGA connector, device power cables, ATX accessories are good examples that deserve attention. With no assurance of properly and correctly accommodating these modules and devices, it is very possible to encounter system failures that result in malfunction of any device.

To make sure that you have a successful start with ROBO-8780VG2A, it is recommended, when going with the boot-up sequence, to hit "DEL" or "F2"key and enter the BIOS setup menu to tune up a stable BIOS configuration so that you can wake up your system far well.

Loading the default optimal setting
When prompted with the main setup menu, please scroll down to **"Restore Defaults**", press "**Enter**" and **select** "Yes" to load in default optimal BIOS setup. This will force your BIOS setting back to the initial factory configuration. It is recommended to do this so you can be sure the system is running with the BIOS setting that Portwell has highly endorsed. As a matter of fact, users can load the default BIOS setting any time when system appears to be unstable in boot up sequence.

Improper Disable Operation
There are too many occasions where users disable a certain device/feature in one application through BIOS setting. These variables may not be set back to the original values when needed. These devices/features will certainly fail to be detected.

When the above conditions happen, it is strongly recommended to check the BIOS settings. Make sure certain items are set as they should be. These include the Serial Port1/ Serial Port 2 ports, USB ports, external cache, on-board VGA and Ethernet.

It is also very common that users would like to disable a certain device/port to release IRQ resource. A few good examples are

Disable Serial Port1 to release IRQ #4
Disable Serial Port2 to release IRQ #3
Etc…

A quick review of the basic IRQ mapping is given below for your reference.

IRQ#	Description
IRQ #0	System Timer
IRQ #1	Keyboard Event
IRQ #2	Usable IRQ
IRQ #3	COM2
IRQ #4	COM1
IRQ #5	Usable IRQ
IRQ #6	Diskette Event
IRQ #7	Usable IRQ
IRQ #8	Real-Time Clock
IRQ #9	Usable IRQ
IRQ #10	Usable IRQ
IRQ #11	Usable IRQ
IRQ #12	IBM Mouse Event
IRQ #13	Coprocessor Error
IRQ #14	Hard Disk Event
IRQ #15	Usable IRQ

It is then very easy to find out which IRQ resource is ready for additional peripherals. If IRQ resource is not enough, please disable some devices listed above to release further IRQ numbers.

5.3 FAQ

Symptom: SBC keeps beeping, and no screen has shown.

Solution: In fact, each beep sound represents different definition of error message. Please refer to table as following:

Beep sounds	Meaning	Action
One long beep with one short beeps	DRAM error	Change DRAM or reinstall it
One long beep constantly	DRAM error	Change DRAM or reinstall it
One long beep with two short beeps	Monitor or Display Card error	Please check Monitor connector whether it inserts properly
Beep rapidly	Power error warning	Please check Power mode setting

Information & Support

Question: I forget my password of system BIOS, what am I supposed to do?
Answer:You can simply short 2-3 pins on JP5 to clean your password.

Question: How to update the BIOS file of the ROBO-8780VG2A?
Answer:1. Please visit web site of the Portwell download center as below hyperlink and register an account. **(The E-Mail box should be an existing Company email address that you check regularly.)**
http://www.portwell.com.tw/member/newmember.php
2. Input your User name and password to log in the download center.
3. Select the "Search download" to input the keyword "ROBO-8780VG2A".
4. Find the "BIOS "page to download the ROM file and flash utility.
5. Execute the zip file to root of the bootable USB pen drive which can boot to DOS mode.
6. Insert your bootable USB pen drive in ROBO-8780VG2A board and power-on.
7. Boot to DOS mode then input the "Update" command to start to update BIOS process.
8. Switch "Off" the Power Supply when you finished the update process.
9. Wait 5 seconds then switch "ON" the Power Supply then press the "Del" or"F2" key to BIOS to select "Restore Setup Defaults" and then select "Exit Saving Changes" option.

Question: What is the limitation to use ISA card with ROBO-8780VG2A?

Answer: The chipset can't assign the resource of the I/O space and memory space to ISA device directly. It must be assigned by manual and need to modify the ROBO-8780VG2A BIOS.
If you want to use ISA card, please contact with us firstly.

Question: Why ISA card with DMA mode can't work on ROBO-8780VG2A?

Answer: DMA mode support was removed from ICH 6 by Intel. It's chipset limitation.

Note:
Please visit our technical web site at http://www.portwell.com.tw
For additional technical information, which is not covered in this manual, you can mail to tsd@mail.portwell.com.tw or you can also send mail to our sales, they will be very delighted to forward them to us.

System Memory Address Map

Each On-board device in the system is assigned a set of memory addresses, which also can be identical of the device. The following table lists the system memory address used for your reference.

Memory Area	Size	Description
0000-003F	1 K	Interrupt Area
0040-004F	0.3 K	BIOS Data Area
0050-006F	0.5 K	System Data
0070-03DE	13 K	DOS
03DF-0FED	16 K	Program Area
07EE-9CBF	595 K	【Available】
First Meg -- Conventional memory end at 635K --		
9EC0-9FFF	5 K	Extended BIOS Area
9CC0-9EBF	5 K	Unused
A000-AFFF	64 K	VGA Graphics
B000-B7FF	32 K	Unused
B800-BFFF	32 K	VGA Text
C000-CD7F	54 K	Video ROM
CD80-EFFF	138 K	Unused
F000-FFFF	64 K	System ROM
HMA	64 K	First 64K Extended

Interrupt Request Lines (IRQ)

Peripheral devices can use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Interrupt Request Lines IRQ		
IRQ#	Current Use	Default Use
IRQ 0	Unused	System Timer
IRQ 1	System ROM	Keyboard Event
IRQ 2	【Unassigned】	Usable IRQ
IRQ 3	System ROM	COM2
IRQ 4	System ROM	COM1
IRQ 5	【Unassigned】	Usable IRQ
IRQ 6	System ROM	Diskette Event
IRQ 7	【Unassigned】	Usable IRQ
IRQ 8	System ROM	Real-Time Clock
IRQ 9	【Unassigned】	Usable IRQ
IRQ 10	【Unassigned】	Usable IRQ

IRQ 11	【Unassigned】	Usable IRQ
IRQ 12	System ROM	IBM Mouse Event
IRQ 13	System ROM	Coprocessor Error
IRQ 14	System ROM	Hard Disk Event
IRQ 15	【Unassigned】	Usable IRQ